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Vol. XXXII SEPTEMBER, 1922 No. 9

THE LARYNGOSCOPE

AN INTERNATIONAL MONTHLY JOURNAL
DEVOTED TO DISEASES OF THE

EAR - NOSE - THROAT

FOUNDED IN 1896 BY

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Subscription, $6.00 per Annum, in Advance.

Foreign Subscription, 35 Shillings per Annum, Post Free.
Single Copies, 75 cents.

PUBLISHED BY THE LARYNGOSCOPE CO.
3858 Westminster Place, St. Louis, Mo., U. S. A.

FOREIGN OFFICE, BAILLIERE, TINDALL & COX,
8 HENRIETTA ST., STRAND, LONDON, ENG.

[Entered at the Postoffice at St. Louis, Mo., as Second-Class Matter, in July, 1896.]

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Subscription, $2.00 per Annum.
Single Copies, 50 cents.

PUBLISHED BY
THE LARYNGOSCOPE CO., ST. LOUIS.

Entered at the Postoffice at St. Louis, Mo., as Second-Class Matter, February, 1922

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VOL. XXXII ST. LOUIS, SEPTEMBER, 1922 No. 9

ORIGINAL COMMUNICATIONS.

(Original Communications are received with the understanding that they are contributed exclusively to THE LARYNGOSCOPE.)

IS ADULT LIP-READING WORTH WHILE? A DETAILED STUDY OF 108 CASES.

DR. GORDON BERRY, Worcester, Mass.

General Remarks: It is the purpose of this paper to discuss the remarkable work of the Army Lip-Reading School at Cape May, New Jersey (later transferred to Fox Hills, Staten Island), to explain the causes of its success and to suggest wherein we, in civil life, may gain from this unique experience. These deductions are based on the writer's intimate connection with the school during practically its entire existence, on his observations as medical officer-in-charge during eight months, on his own experience as a pupil, on the official records of the enrolled students, and upon subsequent detailed reports from the school principal, Miss Enfield Joiner, who went to Washington when the school was closed in December, 1919, to take charge of the follow-up work on the deaf soldiers conducted by the Bureau of Rehabilitation.

Lip-reading deals with two distinct types: the deaf-mute child, and the deaf but not mute adult. When one visits a state institution for the deaf, one wonders at the patience and optimism of the teacher, who, under such handicaps, lights the torch of intelligence for these little unfortunates. The inmate occasionally develops a scholarly mind, usually becomes a happy self-supporting citizen Even the pessimist realizes how worth while it is when compared with any other method of teaching. We are concerned in this paper with the second or adult type.

*Candidate's Thesis accepted by the American Laryngological, Rhinological and Otological Society.

Our men would seem to have been hopelessly handicapped when compared with the average deaf adult in civil life who tries to learn this art. As will be pointed out, the soldier was uneducated, unwilling to learn, discouraged, desiring nothing but to go to a sympathetic home where a grateful government would support him for the rest of his unhappy days. How then, were we able to mould from this common clay results not equalling, but surpassing those in civil life? The self-sacrificing devotion and contagious enthusiasm of the principal and her eight co-workers will account for much, but devoted skilled teachers are available in civil life though circumstance does not group them so efficiently.

The inception of the school under Colonel Charles W. Richardson's tireless enthusiasm and Lieutenant-Colonel John M. Ingersoll's sympathetic guidance, the story of the nine expert teachers so carefully selected from the four corners of our country, the early beginnings, discouragements and difficulties, these are matters of history. It is our purpose to inquire into how this work was done and what results were obtained, in the hope that from our investigation we may find an answer to our question, and somewhat of profit for ourselves and for our deaf patients. Statistics are available, first hand impressions are here. Let us search through these data as to the types of men in the school, their previous educational advantages, the nature and severity of their deafness, the methods employed to teach them lip-reading, the response shown, and the permanency of these results. Conclusions will then be drawn which may perchance be illuminating.

DISCUSSION OF THE SCHOOL.

1. *Enrollment:* During its seventeen months' existence 112 men were enrolled in the Army Lip-Reading School. Four of these were soon taken out because they did not need this help. The remaining 108 comprise the group under discussion. Nine of these were born in eight foreign countries, the remainder were born in the United States. The average age was 26 years. Table 1 shows that most of them were enlisted men, and before entering the army were of the so-called laboring class.

TABLE I. OCCUPATIONAL STATUS.

Prior to Military Service.		Rank in the Army.	
Farmers	21	Nurse	1
Laborers	13	Captains	2
Clerks	11	Lieutenants	6
Machinists	6	Sergeants	6
Electricians	5	Corporals	2
Chauffeurs	4	Seamen	2
Scattered among 31 trades	48	Privates	89

The men were then relatively low in the economic scale. This would indicate a low mental acuity, lower than the average; a fact more clearly shown in Table 2 where we find less than one fifth with more than grammar school training, while one quarter were illiterate.

TABLE II. EDUCATIONAL ADVANTAGES.

College trained	4
High School trained	16
Grammar School	23
Primary School	38
Illiterate	27

2. Degree and Cause of Deafness: The arbitrary standard as to the degree of deafness qualifying for admission to the school was set by Col. Ingersoll after a careful study of the situation. Inability to hear ordinary conversation at five feet placed the man automatically in the school; he had no choice in the matter. A few showing progressive deafness were enrolled before their hearing had reached the five-foot limitation. Thirteen had their hearing so improved by treatment that they no longer needed lip-reading and were removed from the school. Some were totally deaf in one ear but had fairly good hearing in the other ear. Such were not assigned to the school. Most of the men had seen active war-fare, for 101 or almost 93 per cent went over-seas. Thirty-two of the entire group showed "total deafness," 13 could hear only a "shout" 24 heard more than a "shout" but less than "conversation" at 1 foot.

The extreme types of deafness were auditory nerve forms while the less severe cases were of catarrhal or suppurative origin. Most of the auditory nerve paralysis cases were of toxic origin in which meningitis was the chief cause, with influenza, scarlet fever, measles and mumps following. The concussion types of deafness were two-fold, those where there was a sudden heavy detonation near the ear, and those where the repeated and practically constant noise of heavy gun-fire created an auditory paralysis. Fifty-two of the 108 cases were suddenly deafened, 56 became progressively deaf, 2 showed an added hysteria. Table 3 gives a summarized list of the different forms of deafness and their frequency.

TABLE III. CAUSES OF DEAFNESS.

Otitis Interna,	the result of meningitis	24
	other toxemias	14
	extension from middle ear forms	20
	shell explosion	15
	gun-fire (repeated)	6
	basal fracture	3
Otitis Media (11 duplications)		
	suppurative origin	24
	catarrhal origin	13
Hysteria (complicating the above)		2

Thus the cases of pure middle ear involvement were only 26, against 82 cases (76 per cent) of internal ear deafness. This 76 per cent showing partial or complete auditory nerve paralysis parallels the 32 (almost one-third) totally deaf of the 69 (about two-thirds) that heard conversation at less than one foot.

3. Course of Instruction: The work was based upon Miss Martha E. Bruhn's classic book on the Müller-Walle method, this serving as a starting point to which were added many exercises culled from the teachers' large experience and from other authors. The progression was through definitely graded exercises. The teacher was changed from time to time in order that the student might get the benefit of varying methods and learn to read different lips. Every man came under at least four teachers, and they and the principal determined his grading from week to week, deciding finally as to his fitness for graduation, irrespective of the time consumed to complete the course. The average of these weekly grades gave his final rating. Five classes or degrees of excellence were distinguished.

TABLE IV. GRADES FOR MARKING STUDENTS.

Class I.	Excellent.	Ability to get 90-100% of what was said.
Class II.	Good.	Ability to get 80- 90% of what was said.
Class III.	Average.	Ability to get 70- 80% of what was said.
Class IV.	Fair.	Ability to get 60- 70% of what was said.
Class V.	Poor.	Ability to get less than 60% of what was said.

Group teaching was attempted and was found to be so inadequate as compared to individual work, that it was abandoned. We had twelve teachers including the principal. Three of these were assigned to teaching defective speech cases, an entirely separate group. The remaining nine taught from eight in the morning until three in the afternoon (with an hour and a half off for dinner), giving individual lessons to the men in turn. This meant an average of thirty-nine lessons per week, each representing concentrated and energetic effort, a truly hard schedule. The amount of work that each man should have daily was a matter of early experimentation. We found that it took perhaps fifteen minutes to get under way, and that a half-hour period did not yield as permanent results as a longer one. An hour was tried, but the concentrated work for so long proved too much, making the last fifteen minutes wasted. The compromise of a forty-five minute period was adopted, and experience proved it the best length. The frequency of these periods went through a similar stage of experimentation. We were anxious to crowd the men all we could. The decision came to three periods a day, two in the morning and one in the afternoon. The remainder

of their day was so filled with medical treatments, vocational exercise, and play, as to take their minds off of this work. As they progressed, they were encouraged in every conceivable way to talk with their fellows. Mirror exercises were tried, but the work in the class-room and the intercourse with the other men proved better practice. The detail of class-room arrangement also went through a process of change. Extraneous noises troubled the teacher, while extraneous motions took the student's eyes away from the teacher's lips. A quiet small room with good daylight illumination which the teacher faced, a small table between two straight-backed chairs, such was the ideal equipment. As there were not rooms enough, we were obliged to put two groups of teacher and pupil in each room. With a little fore-thought and planning this answered very well.

4. *Methods of procedure:* At first, charts showing the mechanics of speech production were used. These were of interest to the analytically minded, but proved more confusing than helpful; so they were abandoned. The teacher followed a carefully graded course, but the pupil followed from lesson to lesson as a child would, without understanding its progression. First, familiarity with the essential vowel sounds was gained. Then in succession these vowels were used in conjunction with labial consonants, then dental consonants, then palatal and throat sounds. As his vocabulary became enlarged it was used in the composition of sentences which in turn became harder and more complex. Almost before the pupil realized it, he found himself seeing words insteads of sounds, groups of words instead of individual words, and finally the skilled reader would follow the lips as one glances down the printed page, grasping the meaning with little thought as to the individual letters and words. Thus, step by step was the eye trained, the power of picture-visualizing of lip-movement groups developed. In a few this power is already present; occasionally it is developed with but little effort; for most, it is a tedious and nerve-racking process. In a man's ability to develop these instinctive brain paths lies his success as an expert lip-reader.

PERSONAL OBSERVATIONS.

1. *The Writer's Efforts As a Lip-reader:* It chances that the writer has a chronic catarrhal deafness and he was urged to take advantage of this opportunity to learn lip-reading. Through the courtesy of his fellow officers, he was granted an hour off each day to devote to this work. Interruptions were frequent, days passed without any lessons, progress was slow. To see an illiterate negro

acquire in a week what it had taken him a month to get, was not particularly reassuring. Through it all he tasted the hesitations and discouragements, the successes and failures the other men had described. As a rule he hurried to his lesson from some task which had been absorbing his attention. If he could drop completely from his mind this previous task, and give his undivided attention to his teacher, the first fifteen minutes gave some accomplishment, but frequently it took this long to get under way. The psychologist tells us that a man's mental reactions are more prompt in the afternoon; the writer found an early morning hour more profitable. A previous good night's rest made a difference. An optimistic, cheerful, but nevertheless persistent and aggressive teacher, who meant business from the first, was better able to get him started. As the lesson progressed, even with occasional rests, the eyes became strained and the brain tired. At times there was an uncontrollable desire to yawn. By the time the forty-five minute period was up, he was as ready as the proverbial school boy after a long hard day, to run out and play. He never took more than one lesson a day, the others took three; he always wondered how they stood it. Perhaps he could have gotten used to it; the others did. He did not get the conjunctivitis and lacrimation that some of the men had (though they had no refractive error), nor did he suffer from the sleeplessness at night which troubled some for a while. Hours of reading the printed page proved far less taxing than watching the teacher's lips for half an hour.

Not only must the eye work, but the memory as well. An illustration will serve. Among the early simpler exercises was the differentiation between such words as "pay," "bay" and "may." As we are not dealing with sounds but looks, these words look exactly the same when spoken. The context alone can tell. If one already has the sense and knows the discussion is about "money," he instinctively eliminates the other words and decides in favor of "pay." But if this key-word or idea of "money" has not yet been grasped, he must retain the different possibilities in his memory until the speaker brings in the key-word. With this obtained, all the lip-movements of the sentence held in the mind as separate parts of a picture puzzle now rapidly fall into their proper places, and the alert lip-reader is already watching for the fragments of his next picture. An analytical mind may here get into trouble by dwelling on detail. The illiterate student was not thus disturbed. He reads the lips as a child absorbs the sentence, instinctively. We find then, that two of the most important factors for success are:

first, the ability instinctively to see and comprehend mouth movements and positions; second, the power to hold without effort the memory picture of succeeding words and word groups.

2. *The Psychology of Lip-reading:* It has been mentioned that the writer succeeded better when he got started well. Success fostered optimism, which in turn fostered success. A stumble not only haulted this progress but turned the tide in the other direction. A word is missed, the teacher patiently returns to it, repeats it, but the pupil cannot make what it looks like fit into the context. The wise teacher now changes the word or the context, approaching the word from a different angle. When once gotten, she brings it in unexpectedly later. The pupil is delighted to find how cleverly he reads that which at first seemed so hard, and on this wave of success he hastens on for new worlds to conquer. Suppose the teacher had insisted that the word in question be gotten, and in the particular sentence. She spends several minutes repeating it. The pupil becomes more bewildered. His eye wanders. She finally writes the word out for him. How stupid the pupil feels to have missed so easy a word. Another comes along, and he misses that. Each succeeding failure is not of importance itself, but the sum-total makes a considerable difference when the hour is done. This phase is italicized for it is thought to be important. If any one holds converse with a lip-reader and the idea is not readily grasped, it is far better to change the word or the context than to delay with useless repetitions. An insistence on such repetition will bewilder the best of lip-readers.

3. *Early Skepticism, Later Enthusiasm:* The early days in the school were the hardest, for none could see the results that might be expected. The men had entered the army, young and strong, with normal hearing in most cases. Now they were returned from the trenches, deaf and despondent. The future was black. They wanted nothing but to be allowed to go home where loved ones would pet and praise, and where the government was to give them a handsome pension. Instead, they were shipped to a desolate beach on the New Jersey shore. The hero had to sit opposite a school teacher three times a day and repeat such exciting sentences as "She may pay," "The cat plays with the ball." Perhaps he was good-natured enough to let her amuse herself in that way for a week, but sooner or later he did not like it and said so. He was under military discipline, but the returned doughboy was a hard man to manage. Occasionally he refused to go on with the work, either

would not report for his lessons, or after reporting would make no effort to learn. On the other hand, a few after trying became so discouraged and despondent that they broke down and cried before their teachers. None but these urging, patient, enthusiastic women could have won through.

Such were the early trying days. Quite different was the experience of the later arrival. The inertia of the unwilling, of the ungrateful, and of the ignorant had been overcome. The newcomer found enthusiasm on every hand. He applied for enrollment before the initial medical examination could be made. After getting started, he would report ahead of time rather than run the risk of losing a little of his hour. He in turn felt responsible for starting the next man out well. Listen to this message of cheer to a raw recruit from one of our poorest pupils.

Note from one pupil to a new arrival:

"I use to be like you are. And look at me now. I am good and healthy. Spinal Medgitus. My neck was stiff and I could not straighten my legs out. I thought I would never be able to walk. I could not see very good either. But everything is all right with me now. Only my ears. A fellow don't need to hear. They learn you how to read the lips here. It is surprising how well you can learn it. I have not took many lessons but I can read the lips a little now. I see a fellow here the other day. You wouldn't know he was totally deef. He could read the lips so good. He was home on a furlough and his parents didn't know he was deef. You can be learned."

4. Some of the Most Difficult Cases: This particular spinal meningitis case proved a peculiarly hard one to teach lip-reading to. Progress was fairly satisfactory during the lesson, but the next day found him back where was the day before. Others showed the same characteristic in a varying degree. It was thought to be due to an actual memory impairment, a consequence of the meningitis. This showed in only the severe forms. Of this type were our two failures. They could read the lips, and with sufficient success to make them far happier than they had been; but in comparison with the others they did so poorly as to be a keen disappointment to their zealous teachers. Others at first equally backward were finally taught successfully, through the persistence and prolonged effort of the teacher. There was never a thought of any man's being unable to learn this most difficult of arts. What could have seemed more useless than the initial work done on one poor illiterate negro who came in dirty and unkempt, apparently lacking the power of intelligent thought, without the sense of hearing or the ability to speak or read or write? Though his vision seemed normal, he customarily stared vacantly into space and paid

no attention to people or things around him. Touching him made him jump and quiver from apparent fright, somewhat as in the shell-shock cases. His attention was gained by passing the hand in front of his face repeatedly. In some way, the records on this case had been lost, and the cause of his deafness, loss of speech and mental torpor was never satisfactorily established, though we were able to gain a definite history of his having been badly frightened by a train, which almost ran over him. Ignorant and confused, he did not know why he had gone to France; but his pleasure and relief were genuine when we were finally able to make him understand that the war was over. "Done killed the Kaiser?" was his first response while a smile lit up his rather sad features. The story of his restoration would fill a volume. His first dawning consciousness came with the sight of a bright thimble. Words began to come, haltingly at first, then more easily. Forty-five minutes were consumed before the teacher could make him understand that she wanted him to move a small object from one place on the table to another. Each succeeding lesson showed progress. His speech returned entirely. His skill in reading the lips was so absolute that visitors amused themselves by speaking in French or Italian to him. His ability to read the mouth motions enabled him to repeat these words, though they made no sense to his untutored mind. In the meantime, he was learning to read and write and figure. Finally he went back to his chickens in the Sunny South, a happy negro, and a wiser.

5. *A Word About the Easy Cases:* To dwell on the hard cases is to give a faulty impression. This has been done rather to show how these methods yielded results comparing favorably with the average lip-reader in civil life though the material to work with would be considered hopeless in civil life. To dwell on the many good cases is easier. Many of the members of this Society were able to see the work when we brought a few of them to the Atlantic City Meetings early in the summer of 1919. You will recall talking easily with them in the hotel parlors, you will remember the speed with which they could catch and answer questions, not only under these informal conditions, but while under the stress of a formal exhibition. Fear and embarrassment overwhelm poorer lip-readers; these men stood before a large gathering and were able to distinguish the lip-movements of questioners in the middle of the audience. Some of the men were so successful that they were requested for the Liberty Loan drive in October 1918. Individual stories had their amusing side. One man enjoyed sitting on the porch of an

evening with his lady friend. She was sure he must hear her until we suggested her getting her face out of range of the bright street light a block away. A second man dreaded telling his people that he was deaf. After a month of training, he asked for his furlough and went home. For two days he kept them ignorant of his deafness, and when he finally told them they did not at first believe him. One of the men was called down to see the Commanding Officer. After the interview, the latter asked the writer whether the man was not a malingerer for he understood so readily that he surely could hear. When sending them home to see their folks we always let them go unattended and they never seemed to have any trouble in getting around. The Red Cross workers planned their travel as they did for those who could hear; they had no added help. Thus stories of their successes and the astonishment of those who talked with them, could be multiplied indefinitely. With this word to outline the measure of this success, let us pass on to a more scientific discussion of their work and its results.

SUMMARIZED RESULTS.

We have noted that the men were graded into five classes according to their ability to read the lips in active practice and that these marks were reported to the officer-in-charge once a week. The final average gave us his graduating grade. The results for the 108 men may be summarized as follows:

TABLE V. NUMBER OF MEN IN EACH GRADES.

I.	Excellent.	57 men or 53%
II.	Good.	23 men or 21%
III.	Average.	5 men or 4%
IV.	Fair.	16 men or 16%
V.	Poor.	7 men or 6%

This shows that though a high standard was required for graduation, 74 per cent of the pupils were graded "good" or "excellent," and could understand over 80 per cent of what was said to them. As would be expected, the "excellent" men completed the work in the shortest time.

TABLE VI. TIME REQUIRED BY DIFFERENT GRADES.

I.	Excellent.	2.1 months.
II.	Good.	3.3 months.
III.	Average.	5.0 months.
IV.	Fair.	5.3 months.
V.	Poor.	6.0 months.

A few completed the course in six weeks. The average time was 2.7 months.

Nor was the educated mind the quickest to learn, the advantage resting a little with the uneducated, as the following table will show.

TABLE VII. AMOUNT OF EDUCATIONAL ADVANTAGES IN EACH GRADE.

Grade	College	High School	Grammar School	Primary Grades	Illiterate	Total
I. Excellent	3	8	13	21	12	57
II. Good	0	2	4	11	6	23
III. Average	0	2	3	0	0	5
IV. Fair	1	3	2	4	6 (3 foreign)	16
V. Poor.	0	1	1	2	3 (all foreign)	7
Total	4	16	23	38	27	108

Tables 6 and 7 seem to show that skill in lip reading is a natural gift, more than an acquired one. Those who made the best lip-readers and remained the best took the shortest time to complete the course. And greater book-learning did not help. Here we find that 65 per cent of the high school or college men attained the first two grades, while 77 per cent of the primary grade and illiterate group also had this ranking. This deduction is borne out by the writer's observations. The rapid pupil was imaginative and quick in ocular observation rather than profound in his thought processes. This need not discourage the educated mind, for two of our college men were among our very best lip-readers. The point made here is that the teacher should rely more on the intuition and imagination of the pupil than upon his analytical acumen and memory.

The degree of deafness of the men in the different grades is of interest. It shows a fairly even distribution in the "excellent" grade, and a preponderance of totally deaf in the "poor" grade. This latter is accounted for by the sluggish mentality of some of the meningitic deaf.

TABLE VIII. RELATION OF DEAFNESS TO EXCELLENCE OF WORK.

Grade	Totally deaf	Hears shout	Conversation up to 1 ft.	Conversation over 1 ft.	Total
I. Excellent	13	10	14	20	57
II. Good	3	2	7	11	23
III. Average	1	1	1	2	5
IV. Fair.	11	0	1	4	16
V. Poor	6	0	1	0	7
Total	34	13	24	37	108

Reviewing briefly these statistics we find that a very large proportion of the men on graduation could understand over ninety per cent of what was said to them; that the average time taken for this work was only 2.7 months (and this average included all the slow pupils); that a higher education was no advantage, for the illiterate learned as easily; and that a total deafness was no handicap, as these men learned as readily as those who could hear a little.

In order to make this report of more scientific value, the writer inserts here illustrative cases which will briefly explain how we can arrive at the above inclusive tables. These representative cases are taken from group 1 to 5, according to their excellence as lip-readers (see Table 4). Each of these five groups is subdivided into three classes according to the educational advantages each had enjoyed: Class A being those with high school training or better, Class B those with some grammar school training, and Class C the illiterates. These are furnished through the courtesy of the recent Federal Board Agent, Miss Joiner, and show the careful follow-up work enjoyed not only by these men but also by those unfortunate war-deafened soldiers, who in the shuffle failed to reach us and had to be picked up after discharge. These latter show a grand total of over five-hundred men and represent an outstanding and splendid chapter in the Federal Board's activities, which cannot be touched upon in this paper.

Table 9. Illustrative cases grouped according to grades of lip-reading skill, and into Sub-classes according to previous educational advantages.

GROUP I. LIP-READING EXCELLENT.

Case I-A. Good education. L. F. B., Cressona, Pa. Rank, pvt. 1st class; age, 29; cause of deafness, exposure; degree of hearing, rt. 1/20; left 5/12/20; education, college graduate; previous occupation, civil engineer; lip-reading instruction, May 9, 1919, to June 26, 1919; grade of work, excellent; further training, refused; married, since discharge; present occupation, civil engineer. Remarks: This man, now employed by State Highway Commission of Pennsylvania, has been able to carry on successfully since discharge. Earning capacity neither increased nor deceased. Gave demonstration of lip-reading before American Medical Association at Atlantic City, June, 1919.

Case I-B. Slight education. G. S., Newport, Kentucky. Rank, pvt. Co. K, gth Inf.; age, 33; cause of deafness, concussion; degree of hearing, rt. 1/20, left 0/20; education, 4th grade; previous occupation, soldier, regular army; lip-reading instruction, July 24, 1918, to Sept. 28, 1918; grade of work, excellent; further training, placement training in lens-grinding under Federal Board; not married; present occupation, lens grinder. Remarks: This man went out after two months' lessons in lip-reading and toured the country for a month, speaking for the 4th Liberty Loan. Red Cross visitor reported to U. S. A. General Hospital No. 11 that she called on this man four times at his place of work before she knew that he was deaf. Federal Board follow-up officer reported that two years after discharge this man's lip-reading was practically infallible.

Case I-C. Illiterate. S. S., colored, Calvert, Texas. Rank, pvt. Co. A, 304 L.B., Q.M.C.; age, 30; cause of deafness, bilateral otitis interna; degree of deafness, total; education, illiterate; previous occupation, farmer (tenant); lip-reading instruction, Sept. 25, 1918, to Nov. 23, 1918; grade of work, excellent; further training, refused; married, previous to service; present occupation, farmer. Remarks: This man reported that he was at home four days after discharge before his wife discovered his deafness. Federal Board agents advised no further training.

GROUP II. LIP-READING GOOD.

Case II-A. Good education. P. W. J., Red Oak, Iowa. Rank, pvt. Co. H, 18th Inf.; age, 18; cause of deafness, chronic suppurative otitis media; degree of hearing, rt. 1/20, left 5/12/20; education, graduate of high school; previous occupation, student; lip-reading instruction, August 5, 1918, to Sept. 28, 1918; grade of work, good; further training, served as supervisor for one year at the Pennsylvania Institution for the Deaf (Oral School); took training under the Federal Board in mechanical drafting; not married; present occupation, student. Remarks: Federal Board follow-up officer reported in December, 1920, that a student, deaf for twenty years, had just enrolled for a lip-reading course in Chicago, explaining that she had not believed in lip-reading until an ex-service man had come home from an army hospital almost totally deaf, but "reading the lips wonderfully." This soldier was identified as Case II-A.

Case II-B. Slight education. J. M., Beaver Falls, Pa. Rank, pvt. Co. F, 111 Inf.; age, 37; cause of deafness, concussion; degree of hearing, rt. 4/20, left 0/20, blind in one eye; education, 4th grade; previous occupation, sailor; lip-reading instruction, Feb. 5, 1919, to May 1, 1919; grade of work, good; further training, refused; not married; present occupation, sailor. Remarks: Red Cross visitor reported that this man was earning more in fall of 1919 than he had earned previous to military service; that his lip-reading was very good; advised no further training.

Or Case II-B. Slight education. J. W., Philadelphia, Pa. Rank, sgt. Co. C, 102 Eng.; age, about 25; cause of deafness, concussion; degree of hearing, rt. 0, left 4/20; education, primary grades; previous occupation, street car conductor; lip-reading instruction, Jan. 21, 1919, to May 17, 1919; grade of work, good; further training, refused; married, since discharge; present occupation, mechanic. Remarks: This man was seen by his teacher, Oct. 22, 1921. In a conversation on Chestnut St., Philadelphia, with a stream of people passing, it was not necessary for her to repeat anything she said to him. The person who happened to be with the teacher did not discover that the man was deaf. He reported that he was doing well, working for the Ford Motor Company at their assembling plant.

Case II-C. Illiterate. W. L., Lucama, N. C. Rank, pvt. Co. I, 324 Inf.; age, 24; cause of deafness, meningitis; degree of deafness, total; education, man practically illiterate; previous occupation, farmer; lip-reading instruction, March 17, 1919, to August 23, 1919; grade of work, good; further training, refused; not married; present occupation, farmer. Remarks: In a private letter, practically illegible, this man in the spring of 1920 wrote his teacher to the effect that he was reading the lips better than he ever hoped he could; that with a few repetitions he could understand strangers very well and had no trouble whatever with his friends. One statement he made was: "I don worry no more about bein deef."

GROUP III. LIP-READING AVERAGE.

Case III-A. Good education. Lt. F. W. B., Shiner, Texas. Rank, 2nd Lt., 56 Art., C.A.C.; age, 21; cause of deafness, concussion; degree of deafness, rt. 1/20, left 1/20; education, high school graduate; previous occupation, student; lip-reading instruction, Nov. 25, 1918, to April 12, 1919; grade of work, average; further training, entered University of Texas to take course in chemical engineering under Federal Board; not married; present occupation, student. Remarks: This man was able to follow along with his classes in the university.

Case III-B. slight education. G. R., Brookline, Mass. Rank, pvt. 1st cl., R.A., Ae. Sq.; age, 19; cause of deafness, scarlet fever; degree of deafness, total; education, grammar school; previous occupation, plumber; lip-reading instruction, July 24, 1918, to November 30, 1918;

grade of work, average; further training, architectural drawing, Wentworth Institute, Boston; preparatory course, Hutchinson School, Boston; expects to enter Mass. Inst. of Technology, Boston, this fall; has studied French under private tutor; has availed himself of all opportunities for lip-reading lessons and has made marked improvement; not married; present occupation, student. Remarks: The ambition of this man is apparently without limit. With only a fourth grade education as foundation, he has been able, handicapped by total deafness, to prepare himself for Boston Tech. One year after discharge, he wrote his teacher of lip-reading: "I have improved greatly during the past year, not only in lip-reading, but in other things. Whoever, or whatever is responsible for my deafness knew that was the only way to teach me things."

Case III-C. Illiterate. No illiterates in this group.

GROUP IV. LIP-READING FAIR.

Case IV-A. Good education. J. E. S., present address unknown. Rank, 1st Lt., C.W.S.; age, about 35; cause of deafness, bilateral otitis interna after diphtheria; degree of deafness, rt. 1/20, left 2/20; education, college; previous occupation, chemist; lip-reading instruction, March 29, 1919, to August 23, 1919; grade of work, fair; further training, refused; married; present occupation, chemist. Remarks: Red Cross follow-up report stated that this man was considered so valuable in his line that he had been retained in the Chemical Warfare Service, U. S. Army; also, that his lip-reading served him well and that he was carrying on successfully.

Case IV-B. Slight education. T. H., Troy, N. Y. Rank, pvt. Baty. C, 149 F. A.; age, 19; cause of deafness, meningitis; degree of deafness, total; education, grammar school; previous occupation, student; lip-reading instruction, Dec. 28, 1918, to May 17, 1919; grade of work, fair; further training, lip-reading at Nitchie School, N. Y., and mechanical drafting; improvement in lip-reading, negligible; not married; present occupation, student. Remarks: The training of this man has been delayed and interrupted by ill health.

Case IV-C. Illiterate. R. J., Gaville, S. D. Rank, pvt. Co. D, 349 Inf.; age, about 28; cause of deafness, meningitis; degree of deafness, total; education, practically illiterate; previous occupation, farmer; lip-reading instruction, May 19, 1919, to Sept. 29, 1919; grade of work, fair; further training, refused; present occupation, farming; married, yes. Remarks: This man wrote to his teacher that he could understand his wife perfectly and his friends fairly well. He made $10,000 in two years on his small ranch. In November, 1920, he wrote: "I can do better on the farm. I don't like cities noway."

GROUP V. LIP-READING POOR.

(Illustrating the Discouraging Cases.)

Case V-A. Good education. J. G., Muskogee, Oklahoma. Rank, pvt. Co. A, 12 Inf.; age, 30; cause of deafness, meningitis; degree of deafness, total; education, grammar school, supplemented by wide reading and study; previous occupation, lumberman; lip-reading instruction, April 9, 1919, to December 13, 1919; grade of work, poor; further training, lip-reading in two different schools, improvement negligible; not married; present occupation, none Remarks: High type of man, but it seems impossible for him to pull together and go to work. Physical condition fair, but mental state depressed.

Case V-B. Slight education, R. H. M., Chicago, Ill. Rank, 2nd cl. seaman, U. S. Navy; age, 18; cause of deafness, meningitis; degree of deafness, total; education, primary grades; previous occupation, none; lip-reading instruction, Dec. 20, 1918, to July 7, 1919; grade of work, very poor; further training, 300 lessons, two per day for six months, in lip-reading—improvement negligible; cabinet making in Lewis School, Chicago; not married; present occupation, student. Remarks: This man has kept on trying steadily and is still hopeful of becoming expert. He

has made some progress, but will never be a good lip-reader. Spirit fine. While in hospital he wrote to another deaf man: "A fellow don't need to hear. It is surprising how well you can learn it. I have not took many lessons, but I can read the lips a little."

Case V-C. Illiterate. O. H., Chicago, Illinois. Rank, pvt. Co. C, 52 Tr. C.; age, about 32; cause of deafness, boiler shop concussion; degree of deafness, rt. 1/20, left 1/20; education, none; previous occupation, metal worker; lip-reading instruction, Feb. 12, 1919, to June 21, 1919; grade of work, very poor; further training, lip-reading and cabinet making, Lewis School, Chicago; married, and has two children, family live with wife's parents; present occupation, student. Remarks: This man will never be able in all probability to support a family again. In addition to being a poor lip-reader, he is stupid and lacking in energy and purpose.

These foregoing cases representing each group are inserted to illustrate in detail the above generalized statistics. They contribute the added note of subsequent success. The Federal Board was able to get in touch with all of our students and discovered how they were faring. In each case they were retaining most of their skill, and where they needed further help, the Board was able to provide it. Most of the men returned to former occupations. In one of the reports we find this comment as to the occupations followed:

"The deaf men whenever it has been compatible with their disability, have chosen vocations wherein their pre-war experience could be capitalized. Two doctors have specialixed in X-ray work and public sanitation work; one lawyer in insurance law. Some of the courses selected by the deaf are mechanical drawing, cabinet making, barbering, printing, shoemaking, accountancy, architectural drawing, cartooning, and journalism."

That the men can read the lips successfully seems to be proven beyond a doubt by the reports from so many varying and unbiased sources. Letter after letter offers its added contribution on this score. Many are doing better financially than they did before they became deaf. The broadening influence of their army experiences is in part responsible, but in many cases the more immediate influence of the high-minded teachers can be directly traced. Under their inspiration, some of the men are seeking a higher education. One man has gone successfully through the first year at one of our post-graduate scientific schools; another who had had only grammar school training is preparing for a Technology school in order to become an architect. The list includes men in our colleges and state institutions.

ADULT LIP-READING IN CIVIL LIFE COMPARED.

While the writer's intimate knowledge of this work in the Army permits him to speak authoritatively in this field, he cannot speak so definitely of any similar group in civil life. Comparisons may,

therefore, seem ill-founded and premature. He has, however, come in personal contact with several of this latter class, has discussed the work with teachers of the deaf in civil life, and has considered this phase with our army teachers who know intimately of civilian work. From these observations and deductions, he cannot escape the conclusion that those in civil life, though starting with greater advantages and a higher mentality, do not attain a like degree of excellence excepting after a much more protracted training, and the percentage of excellent results is lower. One teacher says that the civil work is not as interesting as that in the army. Another writes:

"It seems to me there can be no doubt about the advantage of army lip-reading over that in civil life. That lip-reading means 'eternal practice' is certainly true. The frequent lessons and constant practice enjoyed by the men in the army furnished the surest means of their success. "It has been my experience that the majority of the civilian deaf are prodigal with neither the time nor the money spent on lip-reading. Although, I believe I have never had a pupil who did not seem interested or convinced that it was worth while, if anything had to be postponed it was usually the lip-reading lesson. I can rarely persuade a pupil to come every day for two months, rather than once or twice a week for eight or nine months."

A third teacher describes two cases: one a woman of twenty-eight, a stenographer, who had five lessons a week for five weeks with good results; the other was a banker and college graduate, fifty years old. She says of him: "He was under my instruction for six months but had taken lessons off and on since becoming deaf. He admitted that he never practiced except during his lessons and even then refused to take any sort of drill work. He just wanted conversation or stories, but he really needed intensive drill work. He had one lesson a week."

Another teacher has recently visited a school for teaching adult deaf. Her comment is interesting. "I do not blame doctors much for not believing in lip-reading. They see such poor results. The civilian teachers haven't the organization, the intensive work, the regular attendance, the teaching personnel, or the standards the Army School developed."

One teacher makes this comment: "In civilian life the poor and ambitious can spare neither the time nor the money; the rich are spoiled and pampered and will not work." She adds that she had recently seen a good many deafened soldiers taught by civilian methods and that she could not recall two which she would grade as "excellent," according to our Army standards.

Some of the teachers have kindly furnished data concerning some of their adult deaf students in civil life. The ages range from seventeen to seventy years. Without exception, the more intensive the training, the better the success. In recent pupils where the teachers had been able to use the same methods as those employed in the army, the results were equally gratifying. The age of the pupil seemed to make little difference. Earnestness and continuity of effort were the essential factors. Space does not permit a detailed report. The following summary gained, not only from these cases but from other opinions and from the writer's observations, is very suggestive.

TABLE X. SUMMARIZED COMPARISON.

Army School.

Average age, 26 yrs.; educational advantages, low; time for course, 2.7 months; lessons per week, 12; cost of instruction, about $0.80 per hour; teaching personnel, trained teachers of experience from schools for the deaf; sudden or progressive deafness, equally divided; results, very good in about 75%.

Civilian Teaching.

Average age, 35 to 45 yrs.; educational advantages, rather high; time for course, 6 to 12 months; lessons per week, 1 to 3; cost of instruction, $2.00 to $3.50 per hour; teaching personnel, largely teachers who have learned lip-reading because of their own impaired hearing, and have then gone right into teaching; sudden or progressive deafness, progressively deaf in almost every case; results, a much lower percentage, figures not available.

Some may know of instances where results were equal to ours. The writer's contention is that results equal or better should be obtained; that the soldier's initial unwillingness, his despondency, and his inertia, were real handicaps; that a civilian with the will to succeed and the energy and ability to carry out such an intensive program as the Army School followed, should do better than our students did.

CONCLUSIONS.

Is adult lip-reading worth while? Our answer is: emphatically, yes. We of the Army School have seen its merits and cannot but make a positive and enthusiastic answer. Working with ignorant, many of them illiterate men, men drawn from the lower economic and social strata of civil life, lacking in enthusiasm, desirous only to be allowed to go home and be left alone, from such a group our trained and devoted teachers were able to produce good lip-readers in an average time of 2.7 months. The best took only six or seven weeks. Many were so brilliant that visitors repeatedly insisted that they must hear. According to available testimony, the results obtained from this apparently hopeless material averaged better than that obtained in civil life.

Wherein did this success lie? In our splendid teaching force? Yes. In our military control over the men's activities? Yes. But not in these only. From the above necessarily cursory review of our year and a half of endeavor in behalf of our war-deafened soldiers, I submit that the intensive nature of our program played a very important part in our success. If this is so, and if the civilian results have proved in any measure unsatisfactory, I conclude that civilian teachers and civilian deaf may profit from our experience. This experience would urge that, where feasible, teachers be grouped in schools, centers to which the lip-reading student can repair. These teachers should be especially trained workers, devoting their undivided energies to this work. Whether those who are themselves deaf can make as acceptable teachers, I cannot say. Our peculiar needs were better served by those who could hear. Each pupil had better be under the successive tutelage of several teachers, gaining from the variety of such a training. He should be taught individually, not as one of a group. He should make lip-reading during this intensive study his main business, not an avocation. Lessons should be conducted daily, not weekly; and twice a day is better than once. Practice work should be conducted in addition to the regular lessons. The pupil should be saturated with lip-reading. Thus did we gain notable success, thus can the civilian student gain equal success.

It behooves the otologist to foster this work; urge the teacher toward thorough preparation, encourage the deaf patient through the early discouraging efforts into the benefits his persistence will secure him. The otologist can do more. Lip-reading is in its infancy. The Clarke School for the Deaf under Miss Yale's inspiring leadership again points the way, as it did in 1867, by planning for special research work, taking up for instance the educating of islands of hearing which can be found in some considered totally deaf. In such, and other lines of research, the otologist can help.

Lip-reading is far from a perfect substitute for hearing, but it is the best we have. There are so many deaf seeking relief. Shall we confine our efforts to treating those cases that can be aided, or shall we foster every enterprise that looks towards a lightening of the burden? There are the many auditory paralysis cases whose hearing the present mechanical appliances and electrical magnifiers cannot improve. There are the many partially deafened children in our public schools who cannot keep up with their classes and whom lip-reading would immeasurably help. Peculiarly does this work deserve our enthusiastic support.

SOME PHASES OF NON-SUPPURATIVE OTITIS MEDIA.*

DR. JAMES A. BABBITT, Philadelphia.

The otolaryngologist of today would seem to be expending his major effort upon three types of service—the treatment of increasing deafness, the eradication of the faucial tonsils and submucous septal surgery, and the etiology of this paper rests in the growing conviction that too little attention and discussion is paid to the non-suppurative conditions of the middle ear. The analysis of deafness is painstaking and tedious and its treatment monotonous. The surgery of the septum and tonsils is almost exhilarating in the increasing finesse of technique, the surgical treatment of middle ear and mastoid infection is equally absorbing, but the mute record of our cases of deafened ears claims a more than equal interest.

This topic was chosen as a vehicle to introduce study and discussion of those cases which so often comes to us, with diagnosis, self or specialist made, "nothing can be done for my deafness." With such a patient present the study of the case might revolve about these five considerations.

First: The type of middle ear involvement.

Second: The accurate tests of hearing.

Third: Tubal disturbance.

Fourth: The interpretation of the tympanic membrane.

Fifth: The general systemic contribution.

Omitting the acute catarrhal condition, the three more common chronic states of the middle ear are the hyperthropic or moist catarrhal condition, the sclerotic or "dry" catarrh or, as expressed by Ballinger, "the adhesive processes in the middle ear" and that type which is the theme of such widely divergent world opinion, otosclerosis, whose effect in the middle ear is probably a secondary one producing fixation of the stapes in the oval window.

Accuracy of treatment in these three conditions depends upon accuracy of diagnosis, yet each may be coincident with and complicate the other. A demarcation line of static fluid may be present in an ear already marked with much sclerotic change and fluid drops may be observed after cocanizing the pharyngeal end of the eustachian tube, by the naso-pharyngoscope or Yankauer's direct

*Read before the Philadelphia Laryngological Society, December 6, 1921.

speculum, in an ear with marked evidence of adhesive points—on the other hand, an ankylosed ossicular chain in sclerotic otitis media may readily simulate the secondary results of an osteoporosis of the labyrinthine capsule. The field of an ear treatment is unfortunately as obscure as that of the gynecologist, and much ruthless intervention may escape its just revelation—but accuracy of fundamental diagnosis is of utmost importance for even moderately successful result, and not every middle ear involvement should be routinely politzerized and massaged.

The etiological factors involved are of primary importance in plan of treatment, and this often, in a measure, reverses the process of involvement.

Probably more attention than to any other ear condition in late years has been given to the baffling study of otosclerosis. Wm. Sohier Bryant, in 1911, collaborated the varied opinion of some fifty authors of wide recognition on its etiology—toxic and trophic causes, primary disease of bony capsule of the labyrinth, inherited defect, analogy to osteo-malacia and rickets, secondary extension from middle ear involvement, menstrual irregularities and pregnancy, syphilis, specific inflammatory lesion, origin in the internal periosteum or dura mater, focal thrombosis, chronic osteitis of the temporal bone, degeneration of the auditory nerve, vasomotor origin from sympathetic nerves and central ganglia—these and many other etiological factors have been given for the process of rarefaction of internal capsules. Its difficulty rests in the confused standards of diagnosis. One of our strongest otologists informed me that he saw, in his wide practice, but an average of one case a year, while others have recorded nearer a hundred in similar time. Bezold and Schwarze tests in a measure would seem to apply to sclerotic otitis media as well.

This then is the situation—three important types with catarrhal otitis media sicca lying somewhere in the middle zone and specific treatment of one often contradictory in a measure to the other. Gray, in his careful book on the subject of otosclerosis, emphasizes hereditary basis and the importance of careful study of the family tree, which is often most difficult to obtain. Otosclerosis and fixation of stapes are not identical, as reported in earlier investigations of Bezold and Hartmann. It appears at an earlier age, usually between ten and forty years, is a non-inflammatory disease, more frequently seen in the female sex, middle ear may apparently be normal, drum head regular and Eustachian tube patulous:—its sympto-

matology—distressing tinnitus, increasing deafness, lack of sensitiveness of tympanum and auditory canal, absence of cerumen and rosy tint of thickened promontory from isolated patches of hyperaemia observed through the transparent drum head.

2. Accuracy in tests of hearing would seem to be an index of success in aural diagnosis. Equally important with the diagnosis between internal and middle ear involvement is the obtaining of fixed standards of comparison for later analysis. A patient is untrustworthy in that his suggestion is keen. Under certain treatment his hearing may diminish where as after the return to his normal state there is evidence of improvement; this however on accurate repetition of former tests, does not render proof.

The most important thing would seem to be the obtaining of methods which to the examiner would give an accurate registry of comparison with the normal high and low tone preception, bone condition, the whispered and spoken voice, watch or acuometer. The particular number of fork vibrations in various apparatus is possibly not so important as that the physician make as accurate repetition of his own tests. Fork tests do not supply all data of noise preception necessary, and, unfortunately a wholly quiet office is often unobtainable. Schwabach, Rinné, Weber and Politzer tests should as suggested in one of Emersons recorded discussions, be repeated two to six or eight times for trustworthy diagnosis. Randall has emphasized the importance of the direction of the fork and uniform strength of impact necessary.

3. Tubal disturbance has been given variable importance in middle ear involvement. Holmes has presented a chart of cases showing the result of intratubal application in obstructed conditions and has emphasized the importance of the posterior end of the middle turbinate in its pressure and infective transmission to the pharyngeal end of the tube. Much ruthless surgery has however been done in the nose and throat to relieve aural conditions and much of it without effect. Inflation of the tube may and may not be of value, but if done at all should be accurate, and my own preference is to use catheter and auscultation tube, the former to prevent blowing infection up towards the ear and the second to diagnose an accurate placement in the canal. The patient so frequently misleads by his aceptance of air sounds in the pharynx that the diagnosis should be ours, not his.

4. The interpretation of the tympanic membrane. This is perhaps the most interesting break in the monotony of ear routine.

Each tympanum is an individual study and merits such. Variations in color indicative of trophic change (diagnostic of sclerotic catarrh), variations in the annular margin, transparent thinning, the possible rosy tint over the promontory, modifications of the light reflex, immobility of points opposite adhesive attachments, the pecularily live movements under Siegel otoscope vibration—these points all develop the diagnostic picture.

5. The general systemic contribution. To bring up the general body resistance is as important in middle ear therapy as the locating of focal infection. This means a most minute examination of our patient—the X-ray and pathological laboratories are essential and often the help of the internist. Red, white and differential blood count, with small lymphocyte changes share the importance of the polynuclear count, urinary analysis is often necessary as well as fecal content for evidence of organic contribution as also acidosis test and bacterial examination. Beck quotes a certain success in the use of adrenal injection for types of otosclerosis, and this suggests the importance of studying the thyroid and pituitary, especially in relation to nerve integrity—blood pressure, elimination of all possible focal infection, tonsils, turbinates, adenoids, examination of sexual influence, vasomotor and nerve reactions, eye grounds, modification of digestive condition and most important, abdominal stasis. Habits (alcohol, tobacco and specific) deserved a frank talk on the part of the surgeon, also home and business relation to noise and sleep disturbing agencies. Hygiene, out-of-door life and muscular exercises are important adjuncts.

With the earnest assistance of Dr. McKinney, who I hope will feel free to discuss this paper, we have been recently studying some of these more or less static types of deafness; these patients have been office patients and fully submissive. We are impressed with the strikingly individual characteristics which appear in the course of study; one cannot enter this jury with fixed opinion. These patients almost invariably come assigned with unfavorable prognosis. Mental depression at their situation and optimism for partial relief, or at least, staying of disease advance, are curiously mingled, hence the psychology of the deafened patient plays an important part. We surely all agree as to the potent influence of suggestion and autosuggestion in physiological well being, particularly in vasomotor activity.

In applying the above procedures of diagnosis and classification to these units of deafness personality, and observing cautiously the difference between the deaf and deafened patient, it is of primary

importance to make a fundamental analysis of each patient, investigate his family tree, home environment and habit reaction. Register both his pre-medical history and personal idiosyncrasy. The patient is usually sensitive, often oppressively so, and insanity and suicide are too possible sequellae to fixed deafness. In the three types involving the middle ear whether separately or conjointly the first represents a condition immediately secondary to acute disease; the second is trophic in character, involved with atrophic change, perhaps colloid degeneration; the third is idiopathic—hence the whole picture must be taken, cervical glands, anterior and posterior, thyroid abnormality, the dental arches. Points of external pain or tenderness should be registered, every part of the naso-pharyngeal tract searched for hypertrophic and atrophic change and focal infection. Sinus areas, particularly ethmoid and sphenoid, alveolar margins and mastoid areas, should be examined by every possible illumination and x-ray plate, and these findings analyzed, as much for previous as for present result of infection. With conservative viewpoint the rotation and caloric tests of Barany should be taken in routine in all important cases, and these recorded, with the tables of nerve reaction and picture of the optic fundus.

A patient recently referred, presented these important symptoms, a constant and increasing vertigo with deceptive unilateral head pains, marked timmitis with nearly total deafness on left side, tympanic picture of absolutely flattened and wrinkled membrane, somewhat simulating a relaxed drumhead, and badly distorted nasal septum. Barany tests cleared the non-acoustic labyrinth, and bone condition was about normal in duration—analysis finally focussed trouble in posterior ethmoid region and complete inflammatory block of left eustachian tube. After four or five weeks of treatment, based upon this diagnosis his vertigo and tinnitus have disappeared, having become nearly normal and collapsed tympanic membrane resumed a fair position.

In conclusion may we emphasize the most painstaking study of the eustachian tube, tympanic membrane and the various functional hearing tests. This kind of work cannot be hurried. The catheter study and treatment must be patient, and your own auscultation report rather than the patient's statement, record your success. Study the tympanic membrane with utmost care and under full illumination, its geographic mobility, retraction, relaxation and morbid areas, and let us repeat our hearing tests until we are sure of their accuracy and ponder them, away, from the patient and treatment chair.

It will be seen from the foregoing that more than likely this patient may not be ours to treat, but belongs to our associate otolaryngologist the internist, the pathologist or the neurologist. One of my most recent patients is obtaining her chief relief in treatment for toxaemia due to intestinal stasis.

A concluding plea for the patient. We are dealing with a problem of decreasing human efficiency, one who is losing out in the game. No doubt in most cases a full direction of the patient would produce some measure of local relief. This will often meet insurmountable limitations.

The rare combination of ethical treatment, tactful management, and disinterested judgment will prove the really great otologist.

2117 Chestnut St.

COLLOIDAL SILVER-IODIDE IN THE THERAPY OF EAR, NOSE AND THROAT.

DR. MERRICK F. MCCARTHY, Cincinnati, Ohio.

The introduction of new therapeutic drugs can scarcely be expected to be arrived at by accident or purely by empiricism. Each new therapeutic agent must be thoroughly tested in laboratories as to activity and possible danger and later on subjected to careful clinical tests before being introduced in general medical practice.

About two years ago I approached the Department of Experimental Medicine of a large pharmaceutical laboratory as to the possibility of an organic silver preparation that was active yet non-irritating and non-staining.

All of us are familiar with the several organic silver preparations that have been in the hands of the profession for some years, all of which are dark in color and possess the quality of badly staining the clothing and dressings, if not the tissues. This bad quality of staining had proved so objectionable to my patients as to make it almost impossible for me to use such silver salts.

To my gratification and surprise, I learned that the problem had already been approached and an entirely new silver preparation was about ready for the final test in the clinic. In due time a quantity of this was placed in my hands and subjected to clinical tests for nearly a year.

The most distinguished feature of the new preparation is its milk white color and its almost total absence of staining. On white linen a slight yellowish stain may show after washing, but it does not produce the black or brown stains on clothing, dressings or skin. This will be much appreciated by physicians and patients.

The new preparation is known as Neo-Silvol and is a colloidal compound of silver iodid with a soluble gelatin base and contains 20 per cent of silver iodid. It appears to be soluble in water in all proportions, and the chemists advise me that the solutions of neo-silvol contain the silver iodid in a colloidal form. Silver iodid in the usual form (uncolloidal) is very insoluble in water, but in neo-silvol the particles of silver iodid are so finely subdivided that they are readily soluble in water and are kept from coagulating and precipitating by the gelatin base.

Solutions of neo-silvol are stable for several days and perhaps longer, although my experience is that solutions standing for more than two or three days have a little sediment at the bottom of the vessel that occasionally blocks our nebulizers.

I now have personally treated something over 400 patients, spraying a 10 per cent solution into the nose, as well as prescribing it for personal use by the patient in a 10 per cent solution, to be used as nasal drops. My experience shows that the action of neo-silvol seems to be quite astringent, but without producing pain, and that by its use the ordinary acute rhinitis cases show marked improvement in a much shorter time than usual. It seems to be somewhat more active than the dark colored silver salts in this type of cases and is much more pleasant to work with.

My experience so far demonstrates that neo-silvol has proven to be bland, non-irritating, and of an antiseptic value equal or greater than the dark colored silver salts, much cleaner and much more satisfactory to handle. Neo-silvol fills my needs in all the demand made upon it.

From my records I have abstracted four cases which are typical of the class of patients that I have treated with neo-silvol. I believe these few will answer as illustrations as well as a larger number.

Case No. 1: Dr. M. *History*: Exposed to acute rhinitis. Began sneezing last night, with nasal discharge. This morning nose is beginning to feel quite irritated. "Feels as though he was catching cold."

Examination: Nose: Mucous membrane injected, covered with sticky mucus. Turbinated bodies swollen and with marked injec-

tion. No pus seen. Throat: Negative except for slight glaze to post pharyngeal wall. Ears: Negative.

Treatment: Aspirin grains X, four hourly. Alkalized, catharsis, 10 per cent neo-silvol dropped into the nose, five drops every four hours in each nostril. Twenty-four hours later mucous membrane still injected. Less mucus, no sneezing or nasal discomfort. Forty-eight hours later mucous membrane of usual color. All symptoms have disappeared.

Diagnosis: Incipient Acute Rhinitis.

Case No. 2: Mr. M. *History*: Three days ago began sneezing and coughing. Cough is now better, but nose is severely irritated and draining much serum and mucus. External nares red and irritated. Has some headache over eyes; more severe in the morning. Feels tired out.

Examination: Temperature 99.2°. Nose: Marked glazing all visible mucous surfaces. Much sticky muco pus to be seen in both the inferior and middle meati, right and left. Turbinated bodies beef red, but not swollen. Transillumination of sinuses negative. No marked frontal tenderness. Throat: Tonsils have been removed. Post Pharyngeal wall glazed and injected. Larynx negative, except for a slight injection.

Treatment: Rest in bed 24 hours. Catharsis. Alkalies in the form of Milk of Magnesia and lemonade. Alkaline hot gargles. 10 per cent neo-silvol sprayed into the nose every two hours; 24 hours later not sneezing; 48 hours later patient reports condition much improved. Mucous membrane pus-like, although still injected. Decrease in amount of mucous, not glazed. Headache gone. Patient told not to report for four days.

Diagnosis: Rhinitis acute purulent, with slight involvement of right frontal sinus.

Case No. 3: Mrs. G. *History*: Has been troubled with frequent cough during the last three years. Diagnosis by chest specialist—chronic bronchitis. Occasional dropping in the back of the throat and discharge from the left side of nose. Patient coughs and occasionally spits up foul pus-like material. Has had left antrum operated on. All recent tests have shown antrum to be dry. Cough very annoying at night. Comes seeking relief from cough.

Examination: Nose: Mucous membrane apparently fair condition. No evidence of acute infection; no pus seen. Intranasal contour good. Transillumination frontals and antra clear. Throat: Negative. Larynx, slight cord thickening, with slight injections; otherwise findings negative. Bi-lateral antrum top negative.

Treatment: Prescribed 10 per cent neo-silvol, dropped into the nose three times a day; boric acid ointment 5 per cent in the nose. One month later patient reports no dropping into the back of the throat. Still coughing, but not so much expectoration. Three months later cough has almost entirely disappeared; only slight amount of purulent expectoration following cough. Patient feels much improved.

Diagnosis: Chronic bronchitis secondary to healed antrum infection left.

Case No. 4: Mrs. S.: Severe pain over the right side of the face for four days. Severe nasal cold for two weeks.

Examination: Temperature 99.4°. Nose: Pus in the middle meatus right, just under anterior end and middle turbinate. No pus in the left side of the nose, but nasal tissues seem injected. Transillumination right antrum dark, left antrum and frontals clear. Diagnostic tap local anesthetic revealed much pus in the right antrum. Semi-permanent drainage opening performed under gas, opening being made under right inferior turbinate. Four days later antrum washed and then filled with 10 per cent solution of neo-silvol.

Note: This treatment was repeated at four day intervals, each washing disclosing decreasing amount of pus. Patient dismissed following third washing, to report in two weeks. Washing right antrum at the end of this period revealed no pus. Patient discharged.

Diagnosis: Sinusitis acute purulent superior maxillary right.

Neo-silvol unfortunately is not yet available on the market. I understand that it will be in due season.

2700 Union Central Life Building.

CASE OF ENCEPHALITIS LETHARGICA COMPLICATED BY DOUBLE ACUTE MASTOIDITIS, WITH ACCOMPANYING TEMPORARY BLINDNESS.*

DR. RALPH ALMOUR, New York.

Introduction: Of the complications of influenza in children, broncho-pneumonia and otitis media are by far the most frequent. During the recent epidemic, however, the medical profession has been encountering a cerebral condition referred to as lethargic encephalitis, which appears either as a complication or a sequela of influenza.

The case to be reported is of unusual interest for this reason: that, during the illness we were at a loss to determine whether the intra-cranial condition was of otitic origin, or whether it, like the otitis, was the result of the influenzal process.

Isadore W., age 3, male, was admitted to the hospital complaining of pain in both ears. Thirteen days before admission, the child developed broncho-pneumonia subsequent to influenza, following which pain in both ears appeared. A bilateral myringotomy was performed three days before admission with no resulting improvement.

On admission, the child appeared drowsy and apathetic. The temperature was 103.6,° pulse 120, respiration 30. Breath sounds broncho-vesicular, with a few subcrepitant rales at both bases. Heart negative. Abdomen markedly distended.

The ears showed a purulent discharge in both canals. Behind the right ear, was an erosion about 1 c.m. in diameter, of purpilish color, with a pin-point opening in the center, this area being situated over the tip of the mastoid. The entire mastoid area was swollen and tender. A similar condition, but of lesser extent, existed over the left mastoid region.

The child was seen by the attending neuroligist and the following note made: "There are marked spasms of the left side of the body, tono-clonic in character, occurring at intervals of ½ minute each and most marked in the hand. The eyes stare fixedly for a

*Read at the Section on Otology, New York Academy of Medicine, Nov. 11, 1921.

few seconds and then diverge. The neck is extremely rigid. Slight Kernig on the left, more marked on the right. All other reflexes absent. The child winces on examination and has a faint cry which suggests a tuberculous meningitis."

The laboratory data on the date of admission, February 10, 1921, were as follows: Urine: Trace of acetone; coarse and finely granular casts; moderate amount of red cells; many white blood cells. Blood: RBC., 2.8 Hb., 45 per cent, WBC., 30,800, polys. 77 per cent, monos., 23 per cent. Lumbar Puncture: Bloody fluid under slight pressure, albumen and globulin present, Fehlings reduced, 100 cells all lymphocytes. No organism found in smear or culture. Wassermann negative.

The child was operated on the same night by Dr. S. J. Kopetzky, a pre-operative diagnosis of bilateral acute suppurative mastoiditis with epidural abscess having been made. The findings showed pus in both mastoids. The sinus and dura appeared normal on the right side. On the left, the sinus looked suspicious, both sinus and dura being a little thickened. No evidence of abscess on opening the left dura. A simple mastoidectomy was performed on each side and the dura and sinus were exposed. The wounds were left open and drained with gauze. Culture from the mastoid showed streptococcus hemolyticus.

On the following day, the child was less restless, the neck less rigid, but the reflexes were still absent. The left external rectus muscle showed marked paresis. The spasmodic attacks now occurred at intervals of 4 to 5 minutes. The temperature dropped to 99.2° at 6 p. m. Cheyne-Stokes respirations were noted at 7 p. m. and continued throughout the following day. The child was unconscious to surroundings but took nourishment fairly well.

On the next day, the child was still in a stuporous condition. The spasmodic attacks had now practically disappeared. The right upper extremity showed marked paresis. Left pupil inactive to light, right reacted sluggishly. Accommodation reflex absent in both eyes. Left abdominal present but readily exhausted. Knee and ankle jerks present on right, absent on left. No Babinski or confirmatories. Respirations were still of the Cheyne-Stokes type. Another lumbar puncture was done and the same findings as previously were noted. Blood culture was negative.

The temperature rose to 102.6° the following day. Child slept most of the time but when awake, was very restless and noisy. Consciousness had apparently returned.

On the next day, the temperature dropped to normal and remained so until the twenty-seventh. The paresis, which was apparent before gradually disappeared and the reflexes returned. Sight, however, was impaired, for it could not distinguish either objects or light. Fundi were examined and found normal. Child cried lustily when examined. A lumbar puncture on the eighteenth showed slightly cloudy fluid, Fehlings reduced, albumen present, no globulin, four cells all lymphocytes. A subsequent lumbar puncture on the twenty-fourth revealed a clear fluid with two cells, albumen present, no globulin. In both instances the cultures were negative. All urine examinations after the first were negative.

On February 28 the temperature took a sudden rise to 104.8,° and the pulse became imperceptible. The temperature remained high the following day and dropped to normal on March 2. A lumbar puncture at this time showed clear fluid under normal pressure, albumen present, copper reduced, no globulin, two cells per c.c. all lymphocytes, no organisms found.

The child was taken to the operating room with a diagnosis of sinus thrombosis and an exploration and aspiration of both sinuses performed. The right sinus was aspirated and blood obtained. The sinus was bluish in color. The left sinus was apparently pale but on incising it the blood welled up. No thrombus demonstrated. Blood cultures taken from the sinuses at this time were negative. Hemorrhage was controlled and the wound was packed.

As regards the further course, the temperature dropped to normal and remained so until the time of discharge, April 4. The general condition of the child steadily improved, nourishment was well taken and the drowsiness steadily decreased. On March 16, the nurse first noticed that the child was able to see and recognize objects. The paresis of the extremities and left external rectus disappeared. The child understood all that was said to it. Cerebration was good. The discharge from the middle ears stopped five days after the second operation and the wounds over the mastoids were healed at the time of discharge.

DISCUSSION.

We are dealing here with a case of acute suppurative mastoiditis, which previous to operation had already shown signs of a pre-existing intracranial condition. Operation excluded the presence of either an epidural abscess or a thrombosis of the sinuses. The increased percentage of lymphocytes in the spinal fluid likewise ex-

cluded a suppurative meningitis. Although at the onset, the presence of basilar involvement led us to suspect a tuberculous meningitis, the gradual alleviation of the symptoms ending in the absolute recovery of the child, and the absence of the tubercle bacillus on repeated examinations of the spinal fluid, proved the impossibility of this condition. We are, therefore, forced to limit ourselves to the consideration of the following conditions in order to arrive at a diagnosis: (1) Meningism, (2) Meningitis serosa, (3) Meningitis sympathica, (4) Epidemic encephalitis lethargica.

Any or the above conditions may so closely simulate the other that an accurate differentiation by clinical signs alone would be impossible. In each instance, however, the spinal fluid has more or less definite characteristics which serve to some extent to distinguish it from the others. Meningism, although it presents all the signs of true meningitis, pressure symptoms excluded, reveals on lumbar puncture a normal spinal fluid. In meningitis serosa, where there is an increased exudation of serous fluid, lumbar puncture shows a markedly increased intra-spinal pressure associated with an increase in the lymphocytic elements. The type of meningitis described first by Plaut and Schottmuller, and known as meningitis sympathica, has a characteristic spinal fluid. Here the fluid is under increased tension, but the increase in the cellular elements is always of the polymorphonuclear type.

Can we consider this case as one in which the meninges are in some way or other involved? We can at once exclude meningism as this would not account for the symptoms. It could not cause a paresis of the extremities as was present in this case; the reflexes would, if anything, be increased rather than absent as here elicited; nor could it possibly cause the blindness. Again, the lumbar puncture in this case showed decided changes in the spinal fluid in contra-distinction to what we would expect to find in a case of meningism.

A serous meningitis could readily account for the existing condition. The presence of increased serous fluid with a corresponding increase in the intracranial pressure could produce the tonoclonic spasms in the extremities and the paresis of the left external rectus. It could not, however, produce a total blindness without at the same time causing a papilledema of the discs as a result of this increase of pressure. In our case, no abnormality was noted in the eye grounds. On this fact alone, we feel justified in excluding a meningitis serosa.

Meningitis sympathica, as shown by Strauss, is always concomitant with a suppurative process in the cranium. Whereas an epidural abscess and a sinus thrombosis had been excluded by operation, the most likely condition to be thought of would be brain abscess. Granting that such a condition existed, it must, of necessity, have been very far advanced to give such a degree of prostration with coma and Cheyne-Stokes respirations. The child undoubtedly would have died in a short time and not have gone to complete recovery as it did. Then again, the spinal fluid would have shown a large percentage of polymorphonuclear cells in contra-distinction to the lymphocytic increase in this case. Meningitis sympathica could not cause blindness to result without also causing an edema of the optic nerves.

In view of these considerations, we have dismissed as highly improbable any form of meningitis as a cause of the child's condition. We have yet to consider the possibility of an epidemic encephalitis. The picture that this disease presents is due to an involvement of the mesencephalon and the cerebrum. We are confronted, therefore, with a wide variety of symptoms, which at times may be wholly cerebral, medullary, cerebellar, or meningitic, or a combination of any or all of these. The case here cited showed on analysis the following symptoms: Cerebral: Apathy, coma, paresis of right upper extremity, tono-clonic spasms of the left side of the body, and blindness. Meningitic: Kernig sign on the right side and rigidity of the neck. Medullary: Paralysis of the left external rectus, and Cheyne-Stokes respiration.

We thus see that anatomically considered, all the child's symptoms may be confined to the upper part of the central nervous system. The blindness is undoubtedly of central origin, for there is nothing in the eye grounds to account for either a peripheral nerve involvement or a retinal lesion which the child's nephritis might have caused. The lumbar puncture, in this case indicates rather strongly an encephalitis lethargico. For as Barker, Cross, and Irwin have stated, "A cell count of from 10 to 100 small mononuclears in the cerebro spinal fluid along with a positive globulin reaction and negative Wassermann, and negative bacteriological cultures, is at the time of an epidemic of encephalitis, strong corroborative evidence of the existence of the disease in the patient in whom the process is for any reason suspected to exist." They have also shown that a bloody fluid on lumbar puncture is not out of the ordinary as it seems to be due to the hemorrhagic tendency

that this disease sometimes manifests. The diagnosis of encephalitis lethargica must be made by exclusion, since the disease, by its wide variance in the distribution of the areas involved, presents a great variety of syndromes which are typical to many other diseases. When, however, we get, as in this case, a syndrome, the components of which seemingly point to one of the forms of meningitis, but which, on close consideration cannot be accounted for pathologically or anatomically by a meningeal involvement alone, we must look to some other condition as a cause. A lethargic state, coupled with cranial nerve involvement, during an epidemic of encephalitis, led us to make a diagnosis of encephalitis lethargica.

CONCLUSIONS.

1. The case is of unusual interest, in that we have here two conditions simultaneously appearing as sequellae of a broncho-pneumonia, an encephalitis lethargica and a bilateral mastoiditis.

2. A diagnosis of encephalitis in this case was not to be made until all other conditions of much more common occurrence had been ruled out.

3. It would not have been the proper procedure to have made a certain diagnosis of encephalitis and to have thereby delayed or neglected a secondary operation which was, in view of the clinical findings of that time, a necessary and justifiable one.

236 East 5th St.

SPONTANEOUS RUPTURE OF THE INTERNAL CAROTID ARTERY WITH HEMORRHAGE FROM THE EAR.*

DR. ROBERT J. HUNTER, Philadelphia, Pa.

One of the rarest and most serious complications in Otology, is spontaneous rupture of the internal carotid artery with hemorrhage from the external auditory canal.

This unusual condition has been noted in a number of diseases as follows: (1) Tuberculosis; (2) Scarlet Fever; (3) Chronic Purulent Otitis; (4) Acute Purulent Otitis; (5) Acute Pharyngeal Abscess; (6) Syphilis; (7) Cholesteatoma; (8) Sarcoma; (9) Carcinoma. As we are only considering the spontaneous cases, we have not included in our list the cases due to fracture of the base, wounds of head, paracentesis or corrosion from acid applications to the tympanum, all of which may result in hemorrhage from the ear, due to rupture of the internal carotid artery.

The internal carotid artery commences at the upper border of the thyroid cartilage, and runs upward in front of the transverse processes of the three upper cervical vertebrae to the carotid canal, passing beneath the parotid gland in relation behind with the rectus capitus anticus major, the superior cervical ganglion of the sympathetic, and the superior laryngeal nerve; externally with the internal jugular vein and pneumogastric nerve; internally with the pharynx, tonsil and superior laryngeal nerve and the ascending pharyngeal artery. The petrous portion takes a course like the letter S through the carotid canal in the petrous portion of the temporal bone. It ascends, goes forward and upward and ascends again to enter the cavity of the skull. In this canal it lies at first anterior to the tympanum from which it is separated by a thin bony lamella, which is cribriform in the young and often absorbed in old age. It is separated from the bony wall of the carotid canal by a prolongation of the dura mater and is surrounded by filaments of the carotid plexus. [11]

The cases may be divided into two main groups, acute and chronic. The symptoms vary according to the group in which the case is. The most important symptom is, of course, the hemorrhage. This may vary in all degrees, from a single one causing death in five minutes, to a number causing death in thirteen days. In most instances, however, the hemorrhages are repeated, even as often as twenty times. The great amount is, of course, the point which directs our thoughts to the internal carotid. The blood may

*Read before the Philadelphia Laryngological Society, December 6, 1921.

flow in jets or a steady stream. Compression of the common carotid will lessen the flow temporarily. Hemorrhages from the lateral sinuses are very much less frequent than those from the artery, because when infection invades the sinus walls, we have a clot formed. Politzer cites a case in which the sinus and the artery were both ruptured. No other vessels could give an extensive hemorrhage from the ear, therefore, if the hemorrhage is eight ounces or more, we may feel sure the internal carotid is involved, and of course if the blood flows in great spurts, there is no doubt about it. The blood flows through the Eustachian tube, to the mouth and nose and we have black, tarry stools. In one case the membrana tympani did not rupture and the hemorrhage was from the mouth though the necrotic process was in the ear.[4]

According to Politzer, cases have been reported of hemorrhage from the ear from erosion of the lateral sinus, superior and inferior petrosal sinuses, the sinus caroticus, the cavernous sinus, the jugular bulb and the middle meningeal artery.

In the first group we have scarlet fever, acute otitis and acute pharyngeal abscess. Scarlet fever is the most important cause among the acute infections. The case records indicate that we may have the mastoid or the pharyngeal route of infection. Some of the case records read like acute mastoiditis. Most of these would no doubt be prevented in these modern days from going on to ulceration of the carotid. The pharyngeal cases were those with tonsillitis, peritonsillar abscess or cervical glands breaking down with abscess formation. In some both the neck and ear are involved. The cases reported as acute purulent otitis have, in most instances, been acute mastoiditis, which have not been operated on. The peritonsillar and pharyngeal cases are not likely to be seen in these days. Most of the cases were years ago, before the days of modern surgery. In my review of the literature, I found four cases in which the process originated in the neck and the abscess ruptured into the external auditory canal, probably gaining access through the fissure of Santorini. One[2] began as an acute otitis with rupture of the ear drum and tonsillitis. An abscess formed in the parotid region, and at autopsy the membrana tympani was found intact and a fistula penetrated the cartilaginous portion of the external auditory canal. The artery was ruptured just at its point of entrance to the carotid canal. The author states that the internal carotid caused the bleeding in the throat; that the source of bleeding from the ear was undetermined, but that the post-auricular artery was suspected. As there were repeated hemorrhages of "a cupfull," "a pint," and "it spurted a foot" from the ear, I think

there is no doubt that the internal carotid was to blame. In another case, [8] an attack of follicular tonsillitis was apparently clearing up, when without warning a profuse hemorrhage occurred from the right ear. Examination of the ear and throat gave no information, but later a non-pulsating swelling was noted in the pharynx. As the patient, a child of five years, was in shock, pale, restless and delirious, and a second hemorrhage had occurred, the common carotid artery was ligated at the point of election, resulting in an uneventful recovery. In the third case [9] a boy had sore throat for three weeks and had been convalescent for four days, when a hemorrhage began from the ear. When first seen he had been bleeding for thirty-one hours. There was no sign of otitis media or mastoiditis, but the left peritonsillar area was injected and the parotid and submaxillary glands were enlarged. Two hours later an urgent tracheotomy was performed and the peritonsillar swelling incised and found to contain blood clots. The swelling behind the sternocleidomastoid was incised and a cavity found communicating with the peritonsillar and retropharyngeal spaces. He died one-half hour afterward. An ulceration was found in the internal carotid immediately beneath the base of the skull. In the fourth case [1] which happens to be the first I have a record of, a swelling behind the upper part of the larynx and mastoid muscle, followed shortly after an onset with fever and sore throat. In nine days' time this extended to the "tube of the external ear" and ruptured, evacuating a cupful of pus. Soon afterward, there was a slight hemorrhage; in five days another, and then others of three, ten, twenty and eighteen ounces. The common carotid artery was tied and the patient recovered.

There is evidently a tendency for some abscesses of the pterygo-maxillary fossa to pass upward and rupture through the external auditory canal. I operated on a case of this sort last winter, in which a purulent discharge from the external auditory canal came from a fistula leading to a parotid abscess, and the mastoid was not involved.

Of the chronic diseases, syphilis, cholesteatoma, sarcoma [3] and carcinoma;[6] require no special mention. In tuberculosis of the ear we find the most frequent source of this accident. In these cases we have the history of long standing purulent otitis media. There is little pain and the mastoid may not be involved. In cases in which autopsy shows the mastoid to be involved there may have been no symptoms especially referable to it, except that in some cases facial paralysis may have called attention to the extent of the caries. Pain is conspicuous by its absence. All cases have shown

marked evidence of disease in the lungs and have been advanced cases before the hemorrhage began. Although it is possible that some of the cases reported as due to chronic otitis may have been tubercular in origin, a perusal of the reported cases records does not suggest it. In the cases of chronic otitis we have the usual history of long continued discharge lasting in one case fifteen years. Usually there is an exacerbation with acute pain and often signs of mastoid involvement, but the hemorrhage may be the first sign. Granulations in the tympanum may afford a bloody discharge before the artery ruptures.

In a large number of the otitis cases, we find the ulceration at the first bend in the artery, which is the point most exposed. In three cases there have been two points of ulceration, and in one of these, the first erosion was healed by a firm old thrombus. At the bend, the artery is separated from the tympanum by a thin lamella of bone not more than a millimeter in thickness. With this seemingly slight protection, how is it that we do not have more cases with rupture? I believe that the reason infection in the middle ear does not attack the anterior wall as often as the posterior is, that when we have an infectious congestion of the lining mucous membrane with exudation of serum or pus, the exudate travels in the direction of least resistance, through the aditus, the tube, and by bulging and rupture of the drum. Once within the mastoid cells the exudate is confined and pressure necrosis of the lining membrane with involvement of their bony walls ensues.

The older writers spoke at length of the question, whether the artery wall became infected directly from without, whether the wall was the seat of degenerative changes and whether sphacelae might not be the important factor with mechanical violence to the wall. Quoting from Newcomb[14] we find "the fact that invasion of arterial structure by suppurative processes does happen is now universally believed, but we must remember that until comparatively recently it was a mooted point. It was but forty years ago that Bouchard observed that, while an artery in a purulent focus did sometimes rupture, he was not prepared to admit that the latter accident was referrable to an ulceration in the proper sense of the latter term. In 1873 Cauchois stated that such rupture occurred as the result of the following pathological sequence: (1) Denudation of the artery by destruction of the cellular walls; (2) Suppurative inflammation of the external tunic; (3) Dissociation and disappearance of the muscular fibres of the middle coat; (4) Rupture of the external tunic. Pottenger[15] states that the arteries become thickened in chronic tuberculosis, and that all degrees of involvement

of the vessel walls is seen from very slight trauma, to necrosis. Tubercles may be in the walls of any vessel and the blood vessels may be involved either from without, by extension of a tubercular process or from within, by injury to the vessel walls, by the action of the toxins. F. W. Andrews[16] states that the primary and most characteristic changes in syphilitic arteritis are in the outer part of the tunica media and the adventitia. The changes in the intima are secondary. The adventitia becomes hard and thickened. In the middle coat there are fibrous foci. The cell accumulations in the artery walls habitually pass on to fibrosis. The indurated and fibrotic wall has no strength and resiliency, and the artery wall may give way, forming aneurisms.

Gummas may be found in the vessel walls and these are quite likely the cause of rupture of the carotid. The virus of syphilis exerts a special influence on the blood vessels.

Now as to treatment. The first thing to remember is the value of compression in controlling secondary hemorrhages of the neck. These are so rare nowadays that we seldom have occasion to use the knowledge that was gained through constant practice by our predecessors. As an emergency measure, compression is very valuable and assistants and nurses should be instructed in its application. Keen[17] says in speaking of compression of the common carotid, "The fingers must be thrust backward at the front edge of the sternocleidomastoid until the great vessels are compressed firmly against the cervical verterbra. If this is unsuccessful, thrust the fingers directly in the wound." After the first profuse hemorrhage from the ear, or as soon as you are satisfied that the carotid is involved, the common or internal carotid artery should be tied. Politzer states that in every case the end was fatal, but this is incorrect. Syme,[1] May,[18] Spencer,[13] and Brown[8] have tied the common carotid in hemorrhages from the ear, which were in all probability due to rupture of the internal carotid, and Barr[19] and no doubt others have plugged the ear in cases which were possibly carotid in origin. Marcé[12] had a fatal case in which a previous rupture of the internal carotid was healed by a firm old thrombus. Freeman[20] believes that the cerebral symptoms that so frequently follow ligation of the carotid, may be due to emboli caused by injury to the intima, and suggests as a remedy the use of a strip of fascia lata, carefully tied to occlude the vessel without injury to its inner coat. In no case have I been able to find record of ligation of the internal carotid for hemorrhage from the ear, yet it would seem that this would be the logical procedure, in view of the fact that the internal carotid is practically always the source of trouble, and

especially in cases where the soft tissues of the neck are not involved. I would strongly urge that in these cases the internal carotid should be tied in the future and not the common carotid.

On account of the reverse flow through the circle of Willis, and the impossibility of tying the artery distal to the rupture, the hemorrhage has a strong tendency to recur in spite of ligation. In a case of syphilis Billroth ligated the right common carotid and thirteen days later the left common carotid, for recurrent hemorrhage from the ear, and three days later the patient died of severe hemorrage from the ear, nose and mouth. It would therefore seem that some effort should be made to secure the artery at a point distal to the rupture. A perusal of the reported cases, shows no case of hemorrhage from the ear, in which the rupture was distal to the first bend in the carotid canal, therefore, if we could attack the artery at that point, we would satisfy the law of ligation of the larger vessels, which demands that the vessel must be secured at points both proximal and distal to the rupture. Of course, packing the external canal has been a natural emergency method and as stated before, it is possible, that some cases have been cured by this method. Many others have continued to bleed, however, not only from the ear, but through the tube to the mouth. I would propose, however, to attack the artery directly through a radical mastoid wound, as illustrated in the anatomical specimen which I shall pass around. This should be done after the carotid is ligated and the bone covering the artery, on the anterior wall of the middle ear, internal to the opening of the Eustachian tube, should be removed, giving access to the artery, which should be packed in the opening. The orifice of the Eustachian tube could then be carefully packed and then the entire tube.

The case I have to record is as follows:

Josephine S. Case No. C-4789, age 45, married, was admitted to the Philadelphia General Hospital on April 11, 1920, (service of Dr. Hoyt). Family history, negative. Present illness began five months ago with ear trouble and some cough. She has loss of weight, of strength, cough, expectoration, night sweats, dyspnea, pain in the chest, hoarseness, anemia and emaciation. Physical examination of the chest reveals evidence leading to the clinical diagnosis of marked infiltration of the lungs with cavitation. Tuberculosis of the lungs in the third stage. Prognosis bad. April 15, 1920, facial paralysis on right side. April 17, 1920, arytenoids edematous, cords red and infiltrated, but not ulcerated. Right ear has a profuse purulent discharge. Swelling of the upper wall. No tenderness behind the ear. Left ear normal. Ulceration of the

mouth about the cavity of a freshly extracted molar tooth and spreading in irregular patches to the uvula and palate. The ulceration is superficial. Stomatitis suggestive of Vincent's type. Laboratory reports, smear negative to Vincent's. Tubercle bacilli present in the sputum. April 22, 1920, about 8 a. m. about one-half ounce of blood spurted from right ear while patient was coughing. Condition unchanged. Ear packed. April 22, 1920, hemorrhage from right ear, eight ounces at 12:30 a. m. April 23, 1920, hemorrhage from right ear more profuse than before, at 1 a. m. about twenty ounces. Six-thirty a. m. turned head and another hemorrhage from right ear. About ten ounces. Eight-forty-five p. m. another hemorrhage, seven ounces. Doctor packed ear. April 24, 1920, weak spell at 1 a. m., 2 a. m. sleeping. 5 p. m. patient died. Temperature ranged from 99° to 102°. Pulse averaged 90 to 100, highest 120.. Respiration 25 to 35. Clinical diagnosis. Tubercular mastoiditis with ulceration of either the lateral sinus, or of the internal carotid artery on the right side. Autopsy report abbreviated. Autopsy performed by Dr. Klein on April 25, 1920, at 2:30 p. m., twenty-two hours after death. Gross anatomical diagnosis. Emanciation. Bilateral chronic adhesive pleurisy. Bilateral ulcerative tuberculosis of lungs with cavitation. Parenchymatous acute nephritis. Atrophy of pancreas. Dilitation of right side of heart. Acute myocarditis. Liver, chronic interstitial hepatitis, passive congestion. Ear, mastoiditis with ulceration of internal carotid artery. Cause of death, pulmonary tuberculosis with cavitation. Histological diagnosis: Spleen tuberculosis. Lung tuberculosis. Kidney, parenchymatous nephritis, tuberculosis. Liver, fatty metamorphosis and miliary tuberculosis. Pancreas; atrophic changes. Skull and brain apparently normal. On removal of ear, bones on right hide show necrotic abscess in the middle ear and rupture of the internal carotid artery. No break in continuity of the lateral sinus. An examination of the vessel laid open shows no involvement of its structures, nor thrombi, and the bony walls of the sinus have not been invaded by the necrotic process which has, however, almost penetrated through the sinus wall, there being about one millimeter of bone left.

The mastoid process is one large abscess cavity filled with pus and with few granulations. The middle ear is filled with blood clots and the anterior bony wall necrotic but no actual dehiscence is found, the blood having come through the badly necrosed bone. The internal carotid artery is ruptured at the first bend of the carotid canal, the perforation being 3x5 millimeters.

Pathological report by Dr. Belk:

The gross specimen consists of a section of mastoid process, showing marked necrosis with some thickening: and adjoining bone, less involved. A second piece of bone contains a section of the carotid artery which presents a small irregular perforation about 3x5 mm. Histological sections from about the artery show a markedly chronic inflamatory process. Very dense hyaline connective tissue is infiltrated at infrequent intervals by lymphocytes. Calcification has taken place at several points. Though no typical tubercles are present, the process strongly resembles a chronic tuberculous infection. A section of the carotid artery shows well marked thickening of the intima and media, but no calcification, or other lesion of the vessel per se, that could have caused rupture from within. The perforation was certainly caused by the inflamatory process about the artery.

No attempt was made to ligate the carotid in this case because the patient was very weak and in the last stages of tuberculosis when the hemorrhage first occurred. The autopsy report of such extensive involvement of all the organs would support the wisdom of this judgment.

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1825 Chestnut St.

TONSILLECTOMY SUMP—THE INSTRUMENTAL PREVENTION OF INSPIRATORY POST-OPERATIVE PULMONARY ABSCESS.*

DR. WILLIAM FREDERIC MOORE. Philadelphia, Pa.

During the past few years prominence has been given to the occurrence of lung abscess following the removal of tonsils. Wessler reports a series of one hundred cases of lung abscess, from all causes, twenty-one following tonsillectomy. Prior to 1912 very few cases were reported, since that time Richardson, Bassin, Scudder, and Manges have contributed a few. Lately an astounding number have been observed.

Of the reported number of cases of lung abscess the concensus of opinion is divided, as to their causation, between three modes of infection, namely: (1) Hematogenous; (2) Lymphatic extension; (3) Direct aspiration.

In this paper we are dealing entirely with the latter form. We hope to point out some of the questions of technical difficulties which must arise in the minds of those who are repeatedly doing this work of prevention.

When Lord finds that in 25 cases of 100 reported or 1 in every 4, the cause may be traced to an operation on the upper respiratory passages in the following proportions; namely, those about the mouth (cancer of jaw, lip and tongue) each 1 case; removal of tonsils and adenoids 12 cases (including peritonsillar abscess 1 case); and removal of teeth 9 cases; it makes one wonder whether we are doing every thing possible to prevent this complication, the seriousness of which is expressed by Norris and Landis as 50 per cent mortality in operated cases, and 25 per cent in non-operated, and by Walker as 54 per cent and 25 per cent respectively.

1. *Etiology.* H. L. Lynah states: "I firmly believe that the great majority, if not all, of these abscesses are due to aspiration. Embolic abscess is usually a manifestation of a general pyaemic process and is usually fatal. I cannot recall a single instance of an abscess which has come under my observation that has had the violent picture which is the accompaniment of embolic abscess. The very fact that the clinic is still filled with these cases, even though many of them require bronchoscopic evacuation would seem to

*Read before the Philadelphia Laryngological Society, Feb. 7, 1922.

point very strongly to the simplest cause—aspiration—as the chief etiologic factor in the production of pulmonary abscess."

Louis Hamman divides lung abscess and gangrene into two groups. 1. Those due to aspiration of foreign bodies and infected material into the bronchi. 2. Post-pneumonic, stating that at least 90 per cent of the cases will come under this division.

Clendenning says: "All the single abscess are due to inspiration of infected material. The thing to do is to avoid the aspiration. There are unquestionably embolic abscesses but they are multiple."

The causative factor or factors in multiple and single abscess of the lung is open to considerable argument, and if found, may determine the mode of transmission. At the present time we are trying to localize the lung lobe involved and the character of abscess formation. This can only be of value when the data from large numbers are studied. We are at present endeavoring to get this information and will report it at a later date.

Powell and Hartley state: "Multiple abscesses are, however, most commonly produced by infective emboli, especially in pyaemia. These set up areas of acute septic lobar pneumonia, which rapidly undergo suppuration, giving rise to small abscesses, which are often thickly disseminated thruout both lungs."

2. *Prevention.* Osler has emphasized the necessity of "work." Not the kind that leads one to theorize on knowledge gleaned from books alone, but from actual observation. Experience should enable one to weigh the complications and sequelae and meet conditions as they arise. If actual experience leads one to believe that a real danger may develop when material as a result of this operation enters the larynx; then every means should be taken to avoid it.

(a) Anesthesia: A great many men have discontinued the use of morphine and atropin before operation, because of the effect on the pharyngeal reflex both at the time and after operation. Profound ether anesthesia is not resorted to for the same reason. The pharyngeal reflexes are among the later to be abolished in general anesthesia. Anesthesists will confirm the statement that a major operation can be accomplished on a patient under a degree of anesthesia which would not suffice for tonsillectomy. The mere placing of a tongue-depresser to expose the lower pole of the tonsil will stimulate the reflexes more than the entrance of the scalpel into the abdomen.

The pharyngeal reflexes if they have been abolished during the operation are among the earliest to return. This early return is

inhibited by the administration of morphine. Where the operation has been done under general anesthesia, the patient's head should be kept low when the patient is removed from the table; and when placed upon the carrier or later in bed the prone position is much better than the supine, the head to the side, allowing an easier escape of blood and debris.

(b) Technique: As we all know the crypts of the tonsils are quite commonly filled with plugs of infective material, and the difficulty of securing a method of effectually removing the tonsils which does not at the same time cause pressure on the tissue either when grasping with some form of tenaculum, or later when the snare of some one of its modifications is applied has been noted by all. Suction dissectors and complete expiration with scissors have been used with success, but unfortunately special training and skill is necessary to successfully use these methods. In most hypertrophied tonsils, especially the chronic follicular hypertrophic type, secretion is squeezed out and loose in the throat, at once becomes a menace. We can all recall cases where the follicibles have been filled, and the plugs pop out *en masse* when the snare is applied.

If at this moment deep inspiration preceding a cough takes place how easily one of these bits of infective material may be drawn into the larynx and eventually lodge in a terminal bronchus, subsequently causing a localized infection. It is my firm conviction that not enough attention is given the following points in avoiding inspiratory post-operative lung abscess; namely, (1) Preparation of the patient. (a) Empty crypts as far as possible and apply locally antiseptics to walls or follicles. This may cause local reaction which will soon subside, at which time operation can be performed under improved conditions. (2) During operation every endeavor should be made to keep debris from entering the trachea. We routinely now use suction to keep the field clear, but in addition I would suggest a device which I have found practical. Before the tonsil is snared the usual fenestrated suction tube is taken off, and in its place is substituted a tonsillectomy sump which fits below the tonsillar area and catches a great part of the debris. This has a hole for suction at its distal end at the bottom of the concavity. Nothing would absolutely insure against material gaining entrance to the larynx unless it interferred with breathing, but this device will be found to afford a degree of protection. Tonsillectomy sump is described and presented under new instruments.

The writer is of the opinion that the upright or sitting position for the operation is not devoid of danger, in that infective material

in this position of the patient may easily slip past the epiglottis and the protective closing mechanism of the upper orifice of the larynx in spite of the present pharyngeal reflex if done under local anesthesia and into the larynx, and if the reflex is inhibited by the effect of the anesthetic on the superior laryngeal nerve the danger is even more obvious. We are of the opinion that the position when used should be one of necessity and not of choice. The large number of cases of abscess collected to date, some thirty-eight cases following local anesthesia in one hundred and twenty-five cases following tonsillectomies leads me to make this statement.

Adenoid material, scraped out with a curette, too easily slips away. The LaForce adenatome box is better adapted for the work. Retaining the adeniod masses in a closed receptacle until withdrawn.

CONCLUSIONS.

The danger of lung abscess following tonsillectomy when due to direct inhalation of infected material should be guarded against by: (1) Routine preparation of the field of operation. (2) Elimination of morphine before operation. (3) Protective appliances to keep material out of the larynx during operation. (4) Returning the patient to bed in the prone position with head turned to the side. (5) By operating under a general anesthetic in a prone position with the head lowered. The upright or sitting position being used when general anesthesia is contra-indicated. (6) By removing adenoid material with the LaForce adenatome rather than by curette.

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255 S. Sixteenth Street.

A CONTRIBUTION TO THE ETIOLOGY OF SEPTIC SINUS THROMBOSIS.*

DR. ALFRED A. SCHWARTZ, New York City.

The otitic complications of the acute infectious diseases are frequent, and purulent otitis media, acute suppurative mastoiditis and septic sinus thrombosis find their greatest quota among these. While it is true that septic sinus thrombosis may be caused by a brain abscess or a meningitis due to other causes than otitic, and by contiguity cause the blood vessel infection, the vast majority of cases are those which have primarily or concomitantly attacked the middle ear and mastoid cells.

Influenza and the exanthemata undoubtedly are more frequently complicated with the more serious forms of acute ear disease than other infections, with pneumonia and typhoid following. There is, however, a series which follows the so called "cold," where there has been a purulent nasal discharge, little or no fever, and no prostration, and upon which an acute otitis media and its complications develop.

Whatever may be the bacterial etiology of the exanthamata, the fact remains that in the serious otitic complications which follow or accompany these diseases—especially scarlet fever and the more virulent form of measles—the hemolytic streptococcus is the organism most frequently found upon bacteriological examination. Occasionally the staphylococcus pyogenes aureus is found in the pus of the middle ear and mastoid cells, and rarely another organism. When the sinus becomes involved and the blood stream invasion manifests itself, these same organisms are found. First, the hemolytic streptococcus, which predominates so largely that other organisms found in sinus thrombosis complicating the exanthemata become a rarity; then, occasionally the staphylococcus aureus is found; and finally, very rarely, some other organism is found by culture of the thrombus, removed at operation, or recovered from the blood stream.

The streptococcus is hemophylic in character and feeds and thrives upon the red blood cells. Many strains of the staphylococcus aureus are also hemophylic in character and, proportionate to the virulence of the organism, produce hemolysins which destroy the red blood corpuscles. These virulent forms are rarely found in man, and it

*Read before the Otological Section, N. Y. Academy of Medicine, March 2, 1922.

is therefore rare that a sepsis of otitic origin, due to a sinus thrombosis caused by this organism, occurs. The point to be stressed is that those forms of streptococcus or staphylococcus which are hemophylic are the ones which produce the sinus thrombosis or sinus phlebitis and cause the dangerous sepsis which accompanies the disease.

In the acute otitic complications occuring during pneumonia, the pneumococcus is frequently found in the pus in the middle ear and mastoid cells. Yet when these cases are further complicated by sinus thrombosis, the organism found in the blood stream is only rarely the pneumococcus; far more frequently—in fact, as a rule—the organism found is the hemolytic streptococcus. In this connection it is of importance to remember that the pneumococcus is non-hemolytic and non-hemophylic, and that although there is a pneumococcus septacaemia during the active pulmonic disease, the more severe complications not infrequently present other micro-organisms; and that when sinus thrombosis occurs, the hemolytic streptococcus is the one most frequently found in the blood stream.

During the recent epidemics of influenza many cases of the severe otitic infections have been carefully studied in both civil and military hospitals. The bacteriology of these epidemics has not been entirely cleared; but whatever the causative organism or organisms in the disease itself, the bacteriologic findings in the complicating septic sinus thrombosis have been uniform. As with the exanthemata, the hemolytic streptococcus has been most consistently found in the blood stream. More rarely, the bacillus influenza has been reported. This bacillus is hemophylic in character and cannot grow in the absence of hemoglobin; and this further supports our theory that those organisms which are hemophylic in character are the ones which predispose the patient to the hematogenous infection.

This same condition appears to exist in the group of cases which apparently have their onset in the so-called simple purulent rhinitis, mentioned above. The middle ear and mastoid process may be infected by one of a number of different bacteria, and the condition may not appear serious. Yet in those cases where the hemolytic streptococcus is found, the prognosis should be more guarded, although as a rule the acute otitis caused by this organism clear without serious complications. The blood stream invasion may already be present, and is ever threatening if the disease in the mastoid cells is not completely eradicated. In this class, even when the organism found in the mastoid pus is other than the strepto-

coccus, that which is found in the blood stream is usually of the hemophylic group.

There is a small group of cases of sinus thrombosis in which organisms other than those of the hemophylic group have been recovered—namely, the pneumococcus, the streptococcus viridans, bacillus proteus, and others. But these cases are extremely rare, and some of those reported are undoubtedly terminal infections and not due to the original sinus thrombosis.

In conclusion, we wish once more to present our observation—that otitic infections which are caused by hemophylic microorganisms are the ones which strongly predispose to septic sinus thrombosis; and conversely, that septic sinus thrombosis is, in the great majority of cases, caused by the hemophylic bacteria.

51 West 73 Street.

TONSILLECTOMY SUMP.*

Dr. William Frederic Moore, Philadelphia, Pa.

The tonsillectomy sump is the outcome of an endeavor to remove from the throat debré, which might not be caught with the ordinary fenestrated suction tube. The first instrument was a simple oblong bowl with suction applied through a tube about one-eighth inch in diameter.

The curves of the tube were later altered and the shape of the bowl changed so that the part overhanging the proximal end of the suction tube became square. The bowl was deepened at the sides by building up a square rim. It was found that by carrying the suction point to the distal part of the bowl and by having the tube enter at an acute angle the effect of gravity was secured and the entering suction hole was made larger. The square sides were again changed to a gentle slope from the rim to the bottom of the bowl.

The first work with this instrument was confined to the eversion operation—the tonsils being first grasped with a tenaculum and raised. Up to this point the ordinary fenestrated suction tube was used. The sump was then substituted and placed under the tonsillar area with the distal end of the bowl resting at the inferior pole of the tonsil. The assistant was instructed to keep the near

*Read before the Philadelphia Laryngological Society, Feb. 7, 1922.

end of the bowl away from the tonsil lest the structure fill the drain and thus shut off suction.

In my own work the criticism which I have to make of the instrument are:

1. A right and left instrument are necessary in order to get the right angles for the bowl and have the tube out of the field of operation.
2. An extra instrument in the throat to complicate the work.
3. Time taken in changing from the ordinary tube to the sump although this need not consume more than a few seconds.

Different modes of operation will possibly develop other objections. I can readily see how it may be impracticable, as in the Sluder method or where more room is needed posteriorly as in the finger dissection of the posterior pillar.

Other devices have been tried such as gauze held in place below the tonsil level Dr. Patterson has written to me of a device, which he has been using consisting of a curved tube attached to the suction machine. This is carried low in the pharynx or into the larynx. He says that this very effectively catches debré which has eluded the sponges. This has undoubtedly been a step in the right direction.

I shall be most happy if this device will aid in the more complete removal of debré and thus afford a greater measure of practition in these operations. I take it that we are all agreed that debré loose in the throat is a menace.

I wish to express my appreciation to Dr. Jackson, Lewis and Fetterolf for their kindly interest and helpful suggestions in this work.

255 S. 16th St.

A NEW PARACENTESIS KNIFE.*

DR. HENRY DINTENFASS, Philadelphia.

Paracentesis of the tympanic membrane means incision of that membrane, performed for the purpose of relieving retained secretions. It is the operation most frequently practised in connection with ear conditions. Its advantage, when done early, is unquestioned, but its success is not always complete, the fault being not so much with the operator as with the instruments employed.

Ordinarily the instruments used are the sharp-pointed bistoury and the spear-shaped lancet. Those who favor the bistoury believe that with the wide sweep sufficient opening can be made in the membrane, thereby having an advantage over the spear-shaped lancet, which makes a simple puncture.

The fact remains, however, that in both instances mere slits in the drum head are produced, owing to the fact that the radiating fibres of the connective tissue layer of the membrane are severed in only one plane, permitting of very little gaping.

It is apparent that these slits not only do not give sufficient drainage, but close up long before nature is ready. Again, when using the bistoury, owing to the fear and behavior of the patient, who will draw away from the operator, the well intended long incision ofttimes becomes a pin point perforation.

Therefore, any instrument which is designed to make an open ing large enough, and at the same time cut the radiating fibres so that this puncture will remain open long enough, would be the proper one for the purpose.

The instrument which I wish to present is so constructed that its beveled edge makes a V or triangular shaped incision, cutting the radiating fibres in two planes, thus producing the greatest amount of gaping and naturally giving an opening which is not only comparatively large, but which has a tendency to stay open.

The illustration shows the instrument, which consists of a V shaped trough with a beveled point. Both ends of the V are brought down to a fine knife blade edge, allowing it to make a per fect V-shaped incision. It is fitted in a reversible metal handle to protect the blade.

I have used this instrument for the past year in my private practice and more recently it has been further tested by my colleagues

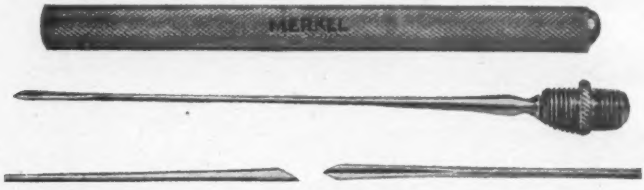
*Read before the Philadelphia Laryngological Association, Dec. 6, 1921.

at the Polyclinic and Northwestern General Hospitals, with the most gratifying results.

A Paracentesis, under all circumstances, is a very painful procedure, unless a general anesthetic is used. An incision must be made with preciseness and speed and be completed before the patient has time to interfere. A single stab from this triangular-shaped instrument in the inferior posterior quadrant of the tympanic membrane, and the situation is handled quickly and completely.

To sum up, the advantages that we have noted are as follows:

1. The operation can be done quickly, which is of a special value in the struggling child, or a neurotic adult.



2. There is more immediate relief from pain.
3. There is better drainage immediately.
4. The triangular-shaped wound stays open until resolution is complete.
5. The process of resolution itself is markedly shortened.
6. There never has been any necessity for secondary paracentesis.
7. There is a lessened tendency, on account of the better drainage, to deeper and more serious trouble, such as mastoid and lateral sinus thrombosis.

1714 Pine Street.

Since article has been written not a single case of mastoid has developed in the several hundred times the instrument has been used.

THE PATHOLOGY AND TREATMENT OF CHRONIC CATARRHAL DEAFNESS.*

DR. PERRY G. GOLDSMITH, Toronto, Canada.

The unsatisfactory results of our treatment of the chronically deaf at the present time is little better than it was 3400 years ago in Egypt, where on an ancient papyrus is written "medicine for the hard of hearing," or, in more recent times, at the first successful aural clinic in the world the Royal Ear Hospital, Dean Street, Soho, founded in 1816. In Wylde and Toynbee's times, 1840-1860, a favorable saying of more than one famous surgeon was, that "ear diseases may be divided into two classes, those that can be cured by the general practitioner, and those which, being incurable, may be relegated to the tender mercies of the ear specialist." Professor Partridge of Kings College in his sarcastic manner speaking to his students on specialists said, "Ah, gentlemen, a little wax is a godsend to an aurist."

A paper dealing with the pathology and treatment of chronic catarrhal deafness, treats of one of the most common of all aural complaints. I feel sure there is a great deal of unnecessary treatment being carried out and this is due in a large measure to a lack of conception or appreciation of the pathological changes underlying the various stages of this non-suppurative inflammation of the middle ear tract. To this must also be added, the rather loose diagnostic investigation so often undertaken. I propose dealing with the changes that take place in the mucosa of the middle ear tract, its ligaments and ossicular chain, and also, draw your attention to some features of central alteration, a psychic rather than pathological change. It is only by a proper understanding of these features that anything like a rational therapy can be developed. It is difficult to state when an acute process may be said to become chronic, but if we accept the statement that chronicity occurs after all macroscopical evidence of inflammation has disappeared, one may place some limit, however imperfect, on the disease. There are I know many cases often the most difficult in which the disease appears to have developed insidiously and with so little inflammatory reaction of the tympanic mucosa as to be unnoticed.

The antecedent changes begin in all cases in an alteration in the mucosa and submucosa of the Naso-pharynx and Eustachian tube.

*Read before the Ontario Medical Association, Niagara Falls, 1920.

Nasal obstruction *per se* does not produce deafness. We all see many cases of nasal obstruction of long standing in which there is no loss of audition. Nasal obstruction from Naso-pharyngeal conditions is a very different matter, for we have here not only the mechanical occlusion of the tube, but the associated tubal inflammation with the change in the mucosa of the Naso-pharynx.

While we admit the original starting point of all Catarrhal Middle Ear reactions has its origin in a similar change in the Nasal or Naso-pharyngeal mucosa, we must remember that the special reaction which has involved the tympanic mucosa, is from its very position not so favorably placed as to be either amenable to nature's curative process, or available to the various topical measures so readily applied to the Nasal and Naso-pharyngeal lining.

It may be helpful to recall to your mind some points in connection with the mucosa of the middle ear proper or tympanum, the antrum and mastoid cells if they are present. Besides lining the walls of the tract it forms folds around the ossicles, ligaments, and tendons in the middle ear and lines the inner aspect of the tympanic membrane. This mucous membrane consists of three layers:

1. Epithelial, which is cylindrical, ciliated in the Eustachian tube and pavement in the rest of the tract.

2. Subepithelial, containing lymphatic vessels and nerves and, in the Eustachian tube, mucous glands.

3. Fibrous which is more or less adherent to the underlying cartilage and bone (Cheatle Encyclopedia Medici).

This membrane responds to irritation as does any other mucous membrane, and its pathological process is only modified when the products of inflammation have not free exit and are uninfluenced by the external air. An inflammation of the Naso-pharyngeal mucosa has a much better chance for rapid resolution than the same degree and type of inflammation in the tympanum with the associated tubal occlusion. In the former free and unimpeded removal of the products of inflammatory reaction contrasts strongly with the slow drainage and absorption in the latter. As the chronic catarrhal or adhesive type of change in the tympanic mucosa is so frequently associated with the various stages of acute Naso-pharyngeal tubal catarrh, one may convey a more comprehensive idea of the underlying pathology of briefly following the microscopical changes in inflammatory conditions in the middle ear cleft.

Here the effect of acute infection is first, redness, swelling due to the engorgement of vessels and exudation of small cells in the subepithelial layer. Proliferation of the surface epithelium and exuda-

tion from the free surface of the mucosa which may be serous or, sero-mucoid, owing to the mildness of the irritation, or in other words, low virulence of the infection, or to a heightened resistance of the host with a wide Eustachian tube, the inflammation may rapidly subside and resolution take place. The sub-epithelial exudation is carried off by the lymphatics, the surface exudate draining away and the vessels return to their normal size.

A history of repeated attacks of this type of inflammation is very common in those who in after years become dull of hearing due to the changes in the mucosa interfering with the conductivity of the air waves. Each attack leaves the mucosa for a long time so sensitive to harmful influence that a slight cold or coryza suffices to produce a return of the inflammation. Politzer says that these attacks are peculiar in that every relapse exceeds the former in duration and often leads to permanent and incurable changes.

If from any cause resolution does not occur and the exudation has been plastic in nature, we frequently find the tympanum containing a mass of gelatinous material which takes months to years to absorb, if it ever completely does so. The usual change, however, is continued engorgement of the vessels, persistence of the exudation with the formation of fibrous tissue in the subepithelial layer. The surface epithelium is lost and the lining membrane becomes converted into fibrous tissue which covers over the labyrinthine windows and invades the ligaments and covering the ossicular chain. In this process adventitious bands form in the tympanum binding the ossicles so as to seriously interfere with their motion and not infrequently the retracted membrance remains so from contraction of these bands of fibrous tissue, or from actual adhesion of the membrane to the promontory. We must remember, however, that the normal middle ear sometimes is traversed by bands of striate which are the residue of the foetal mucosa membrane cushion.

There are many cases in which the formation of connective tissue and exudation co-exist. The mucous membrane is evenly tumefied and its surface uneven glandular or nodular. The depressions of the tympanic cavity, especially the recess of the Fenestra rotunda and the attic are filled with su culent connective tissue.

When the secretion has totally ceased and complete transformation of the newly formed tissue into fibrous connective tissue has taken place, we then find the mucous membrane smooth, thick, dull in color and firmly united to the underlying structures. It is curious that in some cases presenting very defective hearing, there is formed not a diffusely thickened mucosa, but a deposit of fibrous

connective tissue confined to the region of the fenestra, more particularly the round one. It is interesting to recall just here that the hypothesis which ascribes Oto-sclerosis as beginning from a middle ear inflammation whenever the greatest activity of the inflammation was in the region of the oval window. Fraser of Edinburgh has definitely identified middle ear changes in this region as very early cases of Oto-sclerosis. The change taking place in the mucosa of the Eustachian tube are quite similar to those in the tympanum and it is the shrinking of the newly formed submucous connective tissue that leads to narrowing or strictures. The changes found in the drum head are opacities and retraction. The former vary greatly in number and situation. They may be scattered over the membrane, the intervening portions showing darker, or the entire membrane may be like frosted glass. The retraction if long standing is usually permanent, but in these cases the posterior inferior quandrant is generally found unduly movable. Fixation of the ossicles may be noticed if the short process is carefully observed at the edge of a Seigle's speculum. It is important to be able to determine if the drum head and ossicles have lost their conducting power. This we are able to determine by reference to the experiment of Cheatle (Jour. Laryngology and Otology, 1899). He recommended stroking the membrane very gently with a fine probe or camel's hair brush. If this function is abolished the patient will feel but not hear it, or, the noise produced within be very much less than it should be. This might be useful in considering the condition of the other ear when a fibrotic change has already taken place in one. With this understanding of the pathological process which results in the condition called Chronic Catarrhal or Adhesive Deafness, it is obvious that successful treatment presents little or no hope. As the underlying change is a fibrotic one and not a secreting change in its late stages, middle ear fibrosis would be a more descriptive term.

Fortunately the decrease in hearing is seldom uniform. The deafness may remain stationary or even slightly improve. The tendency, however, is for a gradual increase in the deafness and in the later stages there is frequently associated a nerve lesion which in the end may dominate the picture. When the disease is confined to one ear, the other ultimately becomes involved. A deposit of fibrous tissue in the tympanum is also found in those cases of suppurative middle ear inflammation that has existed long enough to be of the chronic type and bony caries has not taken place with the ultimate pathological change in the mucosa. This is but little different from that found in the chronic catarrhal type; the following differences

may be noted in the type known as Otitis Media Purnlanta Risidua, the scar formations is greatest in the attic and around the ossicles and its subsequent retraction often produces great distortion. A perforated drum head is common or flacid scars may be found. The important clinical difference is that in the suppurative type the deafness is not progressive and the change in the membrane are largely confined to its inner or tympanic layer.

TREATMENT.

1. Preventative: I believe that failure to assure ourselves that complete resolution has taken place in the tympanic cavity following acute catarrh of this portion of the auditory tract is responsible for the deafness which ultimately ensues. Sir Wm. Milligan puts it this way (Proc. Royal Soc. Med.), "The neglected exudative catarrh of early life is, *'Facile Princeps'* the main cause of chronic adhesive changes in after life." He believes the indications to incise the membrane and drain the middle ear (as was the practice of Hilton many years ago), is almost as necessary in exudative as it is in suppurative catarrh, the difference being that in the latter it is imperative while in the former it is a matter of individual opinion.

Furthermore Sir William Milligan says, "if we rely upon inflation we merely scatter the exudate for the time being—we blow it towards the posterior end of the middle ear cleft into the tympanic antrum. Soon or later it trickles down into the hypotympanum, there to remain, there to act as an irritant responsible for ultimate formation of the 'Ostial buttress' which is the dominant factor in the production of those pathological changes which ultimately induce distortion and disintegration of the middle ear. Follow the trend of pathological events and see what happens. Interference with the normal ventilation of the middle ear, either from the presence of a small amount of viscid exudate in the hypotympanum or from the presence of a definite although small amount of organized connective tissue around the tympanic orifice of the tube is, I believe, the cause of the ultimate leucocytic activity in the sub-epithelial layers of the mucoperiosteum."

It is important then in cases of tubal and tympanic serous catarrh associated with such conditions in the Naso-pharynx as adenoids, to make sure that you follow the after history of the patient with a careful record of the hearing so as to continue the tympanic treatment until all exudation has been removed. We are all too prone to let well enough alone in those cases of deafness in children which have been rapidly and materially benefited by the removal of adenoids.

Structural defects in the nose leading to a chronic Naso-pharyngeal inflammation should be corrected in those cases subjected to recurring attacks of middle ear catarrh. The hyperplasia of the tubal orifice may be relieved by the use of various pigments, either applied with a post nasal applicator, or better, by direct vision. Living in a suitable climate with careful regulation of patient's habits, diet, exercise, and excretions, will materially aid us in overcoming the tendency to Catarrhal inflammation.

I have so far briefly touched upon some of the measures which may be found helpful in preventing the early stages of the middle ear inflammation. I do not intend entering upon a discussion of the treatment of the various stages of catarrh of the middle ear. I will only direct your attention to that form in which *fibrosis* of the tympanic mucosa has occurred. The object of the treatment is to produce an absorption of the fibrous connective tissue and until we definitely influence this deposit our treatment amounts to little. Are we able to do this? I think not, and it is the history of Otology for the past thirty years, that no method of intra-tympanic treatment, or manipulation has materially benefited the patient's condition.

Take Gruber's text-book, published in 1890, and the more recent one by Dan. MacKenzie of 1921, and you will find in the former, under the head Otitis Media Plastica or Hyperplastica, today's conception of the pathology of this disease and all the methods of treatment since advocated, yet, after a period of thirty years, we find in MacKenzie's book this statement: "There is no known method of curing established deafness that is due to fibroid changes in the middle ear." In Gruber's book, too, you will find reference to the direct injection of fluid through the intact membrane in order to produce absorption of the fibrotic deposit in the tympanic mucosa. How closely does this correspond to Milligan's present day advocacy of opening the membrane in order to treat mucosa directly. Again we find Urban Pritchard in his Presidential address to the sixth International Otological Congress held in London, 1899, referring to the treatment of this disease during the previous thirty years, speak only of advancement made in preventive measures in connection with associated nose and throat affections, and not at all to any real curative therapeutics. Let no one speak but with respect of aurists of bygone days, the reading of whose sayings of years ago should give the grace of humility to the precocious phenom—ever ready to enlighten the Otological World. Such men have been referred to as "those who recklessly under full sail plough through a fog bank in therapeutics tooting their horns."

One must not too readily say there is no local treatment likely to be of any benefit since we are not always able to determine in recent cases that some absorption of the middle ear thickening will not take place. How are we to proceed? Local treatment to the tympanic mucosa by means of air douche, may be productive of benefit and it should be tried. I do not mean by this a long course of inflation until the patient is disheartened. First we should record very carefully the audition powers for all tones and then after inflation repeat the records. The hearing may be worse. Let inflation then stop for all time. Many cases are today being inflated and retrogression of hearing is continually taking place unknown to either the patient or the doctor. The former you cannot blame, the latter, at best you may pity. If, on the contrary, improvement occurs, make sure it is maintained. A temporary improvement lasting for fifteen minutes is common, but rapid return to the former condition is the usual result. Do not depend on what the patient thinks happens to his power of hearing. Definite measurements alone are of value. A short improvement, one lasting for a few moments, I think may be due to the stimulation of the nerve by the air douche when it strikes the cochlea, or influences the labyrinthine tension by displacing the membrane in the fenestra. These cases are very often made worse, distinctly so, by continuous inflation. When there is a definite and lasting benefit one is justified in repeating the inflation, say, two or three times a week for a few weeks, and carefully recording the patient's auditory powers. It is in these cases that one may try the various intra-tympanic injections, or vapors, such as amon. chlor. acetic ether or turpentine. Injections of fluids containing sodi. bicarb., menthol in oil, pot. iodid or pilocarpin, can only be expected to affect the case when there is still some exudation that can be made more fluid and more readily absorbed, or drained away either by the Eustachian canal or lymphatics. We might expect the use of stimulating vapors would assist somewhat in lessening the intra-tympanic thickening, but experience has shown that they are of little or no benefit and the same applies to the use of hot air medicated or otherwise.

On this point Sir Wm. Milligan aptly remarks that these injections frequently do a good deal of harm. "The obliteration or partial obliteration of the tympanic blood vessels, the result of fibrotic change going on in the sub-epithelial connective tissue, seriously impedes the absorption of the injected fluid and we return to the state where we have unabsorbed fluid lying in the middle ear, an irritant and acting as a foreign body." With this hypothesis he

advocates a wash through by means of a catheter and an incised membrane. This incision may be made preferably with a fine cautery point so that it may be permanent.

Inflation has, however, another object, viz: stretching the adhesions and so increasing the conductivity. Some think if they are oiled up a bit by medicated or perfumed oil, they will give more readily. In the early stage of the catarrhal process, there is in the method some virtue, but in the late stages the adhesions are not influenced, but the drum head by continual stretching from the intratympanic air blast or an exhausting speculum produces a flacidity of the membrane very detrimental to its functions. I have had occasion in such cases to find the use of collodium beneficial.

What is one to do, you may well ask, in cases of tubal occlusion of long duration? If the hearing has depreciated, say 75 per cent, it will be of no value to restore the air in tympanic cavity. Some benefit in those less seriously affected may take place by having a more patent tube. This benefit may be temporary, it is true, or it may stay somewhat possibly the progress of the disease. The Eustachian bougie with massage *in situ* is an aid far too seldom employed. It should be passed under inspection with a pharyngoscope. In fact, I am convinced we often think we inflate the tympanum through a narrow tube when actually we have not our catheter in the tubal orifice at all. Furthermore, I feel sure that Politizeration will often inflate the middle ear when we fail to do so with a catheter. Milligan's advocacy of a permanent opening in the drum head will accomplish all a permeable tube can do in these old cases.

What, then, is there to offer in the way of treatment for these fibrotic middle ears? Little, I fear, of proven value, yet experimental work is now being carried out in Manchester by which advantage is taken of the power of radium of transforming the hard dense mesoblastic tissue into soft and pliable embryonic type and with the fibrils arranged in lines parallel to the super—skin and mucous membrane. Everything depends upon dosage, duration of exposure and effective filtration. If this succeeds in its purpose in the middle ear, Otology will have made marvelous strides.

There is another aspect of treatment that must not be omitted. I refer to the operations on the nose for the purpose of curing or preventing the progress of disease. These do not and cannot influence the disease when once fibrosis has taken place. Only when a definite catarrhal condition is induced about the tubal orifice in the exudative stages of the disease can any nasal operation be justified. If there is not a definite improvement in inflation, I caution you that

you may withhold your operative zeal in the nasal air way. But fashion and tradition will, I suppose, ensnare the credulous and unscrupulous Rhinologists whose sum total of Otological scientific knowledge is represented by the number and variety of his turbinal shears and septal resection outfit. Various operations have been devised having in view the intra-tympanic severing of adhesions, but no benefit can be expected and their performance is to be depreciated, but with those Otologists who are always eager to do something more for the patient, it will, I fear, yet be the happy hunting ground, as it was with ossiculotomy in chronic middle ear suppuration.

Are there still those who deceive themselves and their patients by thinking that by removal of the subepithelial or tonsil glands of the oro-pharynx, they will influence in the least the absorption of fibrous tissue in the outer labyrinthine wall and its intersties? I fear there are, and more's the pity.

The association of a nerve impairment in the earlier period of the fibrotic changes, offers some hope for benefit. It is generally largely influenced by a morbid state of the general health, such as anemia, syphilis, chronic nephritis and rheumatism. Toxic influences such as nicotine and that found with intestinal stasis also play their part. Appropriate drugs and measures directed to influence these conditions may be happily combined with nerve stimulants such as nux vomica, arsenic and phosphorous.

If we are not able to influence the course of the disease by aural medications, we may lessen some of its distressing features and of these tinnitis is by far the most important. Its early appearance is of bad omen, and sometimes it so largely dominates the clinical picture that relief from it is more sought by the patients than improvement in hearing. The use of acid hydrobrom (dil) mm. XXV, with very small doses of quinin as advocated by Sir James Dundas Grant, has given me the best results. It is curious that quinin in large doses is destructive in its action towards the vestibular nerve endings, while in doses of ¼ and ½ grains, it appears to have selective sedative effect. A smart mastoid blister, a pilocarpine sweat or a turkish bath sometimes is very useful, and small doses of thyroid have been spoken of favorably. There remains unfortunately many cases for which no medicines are of any value, but which are less affected if assured that there is no brain disease present and in time the noises will assuredly become less. The use of electrical devices to produce a continuous note corresponding to that heard by the patient has had some vogue in France, but English aurists who have

used it do not speak enthusiastically about the method. Lastly, there remains operative treatment of the eighth nerve and even it may not suffice, though audition has been destroyed.

Goldstein (twenty-fifth anniversary number of THE LARYNGOSCOPE), in a paper on "An Acoustic Method for Training the Deaf," classes deaf mutes with some residual hearing as semi-deaf. In this class could come those with grave loss of hearing from catarrhal deafness, with secondary nerve involvement, Itard's work is quoted in this connection: "Musical tones must of themselves serve as an agent to restimulate the defective action of the auditory nerve and awaken its functioning possibilities. Sound vibration is the most valuable stimulation for the ear and a reawakening of the auditory sense cannot be accomplished without its application. We may employ musical apparatus producing intense tones; we may utilize the drum where the grade of deafness is more marked; we may apply the sonorous tones of a bell in intense or mild degree to stimulate the auditory nerve. In deafmutes, where complete deafness does not exist, all tone accessories must be consistently and persistently applied." ("Traite des Maladies de l'Oreille.") We owe much to Itard of France, Toynbee of England and Urbantschitsch of Austria for the present intelligent and systematic training of the seriously deaf in institutions throughout the world.

So far I have endeavored to point out some lines of treatment directed to the disease, and have largely left untreated the patient himself. It was found during the war that hysterical deafness was becoming increasingly frequent. This is considered by Hurst (*Lancet*, Aug. 7th, 1920) to arise from the fact that the initial concussion deafness made such an impression on the soldier that on coming to himself, his first thought was for his hearing and that he might be so convinced that he was permanently deafened that he became actually deaf as a result of auto suggestion. A similar situation may arise when cases of chronic catarrhal deafness are operated upon, they may be very gravely worse because of auto-suggestion.

Hearing, Hurst points out (Crommian Lectures, June, 1920), does not conist merely of the perception of impulses conveyed to the brain when the ear is stimulated by wave sounds. It is an active process and in order that sounds may be heard, the individual must listen. Inattention during a dull sermon results not only in absence of perception of the words spoken, but of total deafness to the sound of the preacher's voice. It is clear that impulses to the cortical center of hearing must be actually interrupted by in-

attention. The most satisfactory hypothesis is that in the act of listening the resistance at the various synapses in the auditory path become diminished by some such process, as a throwing out of dentrities which bring those of contiguous neurones into more intimate connection. In inattention the synapses are unswitched, the resistance being increased by retraction of the dentrites. When our chronic catarrhal patient has been told unfortunately of the hopelessness of his condition, he naturally says to himself, why try so hard, it is so fatiguing ,and after a time he ceases to listen. Then does our patient rapidly become worse, and we have not only a pathological lesion in the middle ear, but also a hysterical element added. A case of a British soldier is recorded who became deaf while he was the only Englishman in a German prison camp. He ceased to pay attention to what was said, as he could understand nothing, and in time he ceased even to hear the unintelligible conversation of his companions. His hysterical deafness was rapidly cured by psychotherapy a year later at Sale Hayne Hospital.

From this it is obviously our duty to encourage our despondent patients who go about ceasing to listen, that they must endeavor to preserve their hearing by improving their listening ability, and while doing this they are to cultivate rather than avoid the art of lip-reading. Most chronic deaf people have already acquired some ability to interpret words from watching the speaker's lips, but they are very reluctant to admit it. We should encourage this by every means and advocate strongly an early course of instruction in lip-reading, so as to avoid the danger of *ceasing to listen*. Besides it will take the patient's attention away from himself, for in a lip-reading class with a good teacher, he will lose that terrible sense of loneliness he has and will no doubt find others who are worse than he. Here the saying, "Misery likes company," and "Things are never so bad but they might be worse," has a direct application.

The French found among their cases of concussion deafness many men who, if they did not make an effort to listen, rapidly became much deafer from a kind of auditory stupor accompanied by noises. It is no flight of imagination to think of many cases of chronic catarrhal deafness in which a stupid, listless expression exists (as Frazer found in Oto-sclerosis) can be made much worse by the same sort of auditory stupor. Babinski has done away with hysteria, he defined its limits; it has become "pithartism" (Baniski and Froment, Hystero-pithartism troubles, reflexes, Military Manuals, University of London Press), that is to say, the predisposition to exhibit certain morbid phenomena which can be created entirely by suggestion and completely cured by the same mechanism.

Gray aptly remarks that "the psychology of individuals who suffer from dullness of hearing is an interesting study, but one that is so seldom considered by the aural surgeons, that it is no wonder many of these patients fall into undesirable hands. Many of these cases are greatly benefited by some sort of treatment different from what they have had, simply because of the well recognized truth, that it is easy to persuade deaf people that they hear better as a result of any new treatment. Others again are benefited because knowingly or not their new advisor has so acted on their mental state that they have been able to throw off, as it were, the super added functional element and improving their hearing at once rapidly re-establishes their listening ability. The psychic influence of a trusted physician upon such incurable cases is often the only thing that is able to give back to them their vital energy. In this manner you have done them much more good than if you try to deceive yourself and them as to their future by a series of attempts at treatment extended over a long time."

In a paper on psycho-therapy in early childhood, Dr. Dingwall Fordyce (Proc. Royal Soc. Med., Vol. XIII, No. 8, July, 1910), says, "Psycho-therapists have developed a complicated science of the subject. They often hypnotize themselves by novel and strange terms and display a tendency to prefer a complicated and elaborate explanation of symptoms and method of treatment to the most obvious. But as every general practitioner has long known, psycho-therapy is one of the most valuable means of treatment he possesses, the silent power he has of developing by various means the patient's cheerfulness, hopefulness, pluck, and faith."

Before, however, referring our cases either to the neurologist, or to the teacher of lip-reading, if we do so, it will add greatly to their efforts if we ourselves explain to the patient how some of the deafness may be benefited. It is by explanation, persuasion, and re-education, the essence of psycho-therapy, that we hope for benefit. The patient is made to understand how he has become originally deaf, and how this has been increased considerably without any change in the bone or ear, simply because he ceased at some time to listen attentively, which caused an increase of his deafness to such an extent that sounds he could easily hear a while back now are not noticed because he has forgotten, as it were, how to listen for them. He is next persuaded to listen intently and is taught that listening is just as active a process as moving, and requires a conscious effort on his part until it becomes automatic once more. Re-education may finally be required in order that the sounds the patient hears

but at first cannot interpret, can be understood, but it will rarely be necessary or required except in hysterical deafness of very long standing.

Could anything be more striking than a case of a young man cited by Hurst (*Lancet*, Aug. 7th, 1920), who was deaf mute from infancy and considered by many aurists as incurable? He has absolute loss of air and bone conduction, and of auditory motor reflex, persistence of deafness during sleep, the characteristic speech of the deaf mute, and great ability as a lip-reader. The vestibular reactions were normal, and acting upon this alone, Hurst was able to prove the functional nature of the condition by restoring his powers of hearing by means of psycho-therapy. The explanation given was that the deafness which developed when he was about three months old, must have been due to some organic but evanescent lesion. It occurred at a period when he was just learning to listen, and consequently interrupted his development in this direction. When the organic cause disappeared, he had become unaccustomed to listen and he never learned to do so again.

Gentlemen: I fear I have given you little to compensate you for your patience and considerate hearing, if my therapeutics is marked by paucity and largely of an advocacy of psycho-therapy, it is so because there is not much else in most cases to offer, but its efficiency is not to be gainsaid. It does not and obviously cannot reach the underlying changes, but it can and does attain a measure of help to many distressing cases.

84 Carlton Street.

Prof. Robert Barany of Upsala, formerly of Vienna, is expected to be a guest of honor at the meeting of the American Academy of Opthalmology and Oto-Laryngology to be held in the Twin Cities September 19th to 23rd. He will then read a paper entitled "A New Method of Radical Operation for Chronic Ear Suppuration."

During the two weeks immediately following the session of the Academy, September 25th to October 9th, Prof. Barany will conduct, under the auspices of the Minneapolis Academy of Opthalmology and Oto-Laryngology, a special intensified post-graduate course in Otology.

A NEW SURGICAL PROCEDURE FOR THE RELIEF OF DEPRESSION OF THE NASAL BRIDGE AND COLUMELLA: ITS FURTHER APPLICATION FOR THE RELIEF OF HUMP AND DEFLECTED NOSES. THE PLASTIC TREATMENT OF THE SYPHILITIC NOSE.*

DR. J. EASTMAN SHEEHAN, New York.

Plastic Surgeon to the Public Health Hospital 38, N. Y. Associate in Laryngology, N. Y. Post-Graduate Medical School and Hospital: Surgeon to the Washington Square Hospital: Consulting Surgeon Specialist to the All Souls' Hospital, Morristown, N. J.: St. Mary's Hospital, Orange, N. J.: and the Port Jervis Hospital, Port Jervis, N. Y.

As you have done me the honor of asking me to read a paper on plastic surgery, I feel the time is ripe, for an account, although short, to be given of my stewardship. I feel that if any one of you had the advantages of which it has been my lot to have and had devoted the time, thought and energy which I have put into this work, you would have produced infinitely better results than those you are about to see.

I am sure you will agree with me that plastic surgery is not easy, that before the war its methods were not fully established, although there is hardly an operation, hardly a single flap in use today, that has not been suggested before; that interest in this most difficult branch of surgical endeavor has had a new birth, since the war, which aroused it. The many novel procedures, which have been devised or elaborated during the war, form an excellent basis for one to apply the principles to civil cases. Deformities of the nose and lips, scars resulting from burns and accidents, birth marks, etc., which not only lower the matrimonial and market value of the individual, besides being a constant source of great anguish and distress to them, can now be made amenable through this branch of surgery. Non-syphilitic disfigurements of the nose form the easiest remediable group in the whole realm of plastic surgery providing the mucous lining and surface covering of the skin are intact.

Before any surgical procedure is attempted a photograph and a plaster cast should be taken. This not only enables the surgeon to better study his case, but it also forms an excellent record.

If the disfigurement is caused by injury an early photograph if possible should be obtained, to enable one to better model the missing

*Delivered before the New York Academy of Medicine, Laryngological Section, April, 1922.

contours. A skiagraph should be taken to determine whether the loss is actual and not merely displacement.

The many intranasal procedures which have been advanced for the relief of disfigurements of the nose of a non-luetic nature, have been worn threadbare in many text books, monographs, and in countless articles on the subject, which I am quite sure would weigh heavily the shelves of a small library. I have always frowned upon these intranasal routes, although in the past I have used them, faute de mieux. They are thoroughly unsurgical and should be condemned to the lumber room of surgery, with the external routes having pride of place today.

Supporting Structures: All sorts of foreign substances have been used to build up the missing contour. Fortunately the recognized plastic surgeons of the world have given up their use. Chondral cartilage stands unrivalled as a means of support for depressions of the nasal bridge. The cartilage should be transplanted free of its pericondrium except at certain places of which I shall speak later; this prevents the cartilage graft from curling up. Cartilage can be shapened to any desired pattern, it is easily handled, has the power to combat infection, and when it takes it remains as transplanted. That there is a permanency of the cartilage graft, has been shown by the experimental work of the American plastic surgeon, Staige Davis of Baltimore, and also by the work of Mr. Killner and Mr. Gillies of Britain. Cartilage may be left exposed for hours when taken from its host and still be viable. For these reasons it is the fascile princeps among nasal supports. Twice the amount should be taken than is required for the case, to insure an ample supply in the event of accidents or infections. The excess is hoarded beneath the skin of the chest.

Foreign substances should never be used as a means of support, as they act, as a rule, as irritants to the tissue, generally sooner or later giving trouble by abscess formation, gangrene, atrophy of the skin and finally expulsion.

It is my opinion, bone should be discarded, as many times it is absorbed. It is hard to handle and difficult to shape; that rough handling of bone lessens its vitality and if once infected invariably must be removed. This holds good whether the bony rib, tibia,ilium or turbinates are used. Bone for malar and mandibular losses is ideal; for if a bone graft is to live as transplanted it must be in contact with bone at both ends, and in these areas this can be nicely carried out, whereas in the nose, this is not the case.

January of last year I had the pleasure of presenting before the Laryngological Section of the New York Academy of Medicine a

new method for relieving the depressions of the nasal bridge and columella, the principles of which were evolved by Mr. Gillies of London. This method I have used twenty-seven times. Not being satisfied in full by this procedure, is my reason for presenting a newer route for the relief of these distressing deformities of the nose.

Anesthesia: Local anesthesia produced by the use of .5 to 1 per cent Novocain in solution has proven to me to be the most satisfactory of all anesthetics. Its use is a decided advantage in the prolonged plastic operations. If one chooses a general anesthetic, intratracheal insufflation of ether is much more satisfactory than any other general form of anesthesia.

Instruments used in operation:

Method: Preparation: the whole face, lip and chin is washed with soap and water, followed with alcohol and ether: a 2½ per cent solution of Iodin is applied to the ala nares and columella. The airway on both sides is packed with dry sterile gauze, ½ inch wide. With a small, sharp plastic scalpel, a vertical incision is cleanly made through the center of the columella, extending from the under surface of the tip of the nose down to the philtrum. The incision is now deepened throughout its full length, till one reaches the vertical edge of the septal cartilage: the septum on both sides is then exposed for a short distance. If the septal cartilage is deflected either to the right or left, blocking the airway, this may be removed in part or in whole. In fact, the complete septum operation may be performed through this incision if there is also a blockage to the airway from the bony septum. After the incision is deepened and the septal cartilage is exposed, one's attention should now be centered upon the control of the bleeding, which is liable to be quite free. We next remove the cartilage of the columella if present. (There are generally some rudiments of cartilage present in these depressed columellae.) The loose tissue of the nose is now separated on each side of the nasal bridge up to the infraglabella region. A bed is now made for the reception of the graft and bleeding is now controlled by an assistant, who exerts firm pressure upon the sides of the nose for a period of three to five minutes.

Preparation of the Cartilage Graft: After the cartilage is removed from the right chest wall, it is wrapped in a dry sterile gauze. The distance from the infra glabella region to the nasal tip is accurately measured and then again from the tip of the nose to the deep tissue of the upper part of the philtrum. This gives one the exact length of cartilage needed. The width of cartilage required is also noted. A triangular piece of cartilage is excised at its proximal end for the

purpose of bending it to a right angle after the graft is shaped to the desired pattern; the perichondrium over the long leg of the graft is removed except over the angulation, the object being to hold the long and short legs of the graft together. The perichondrium is now removed over the short leg of the transplant, except at its far end, which is allowed to flare out from either side in order to hold

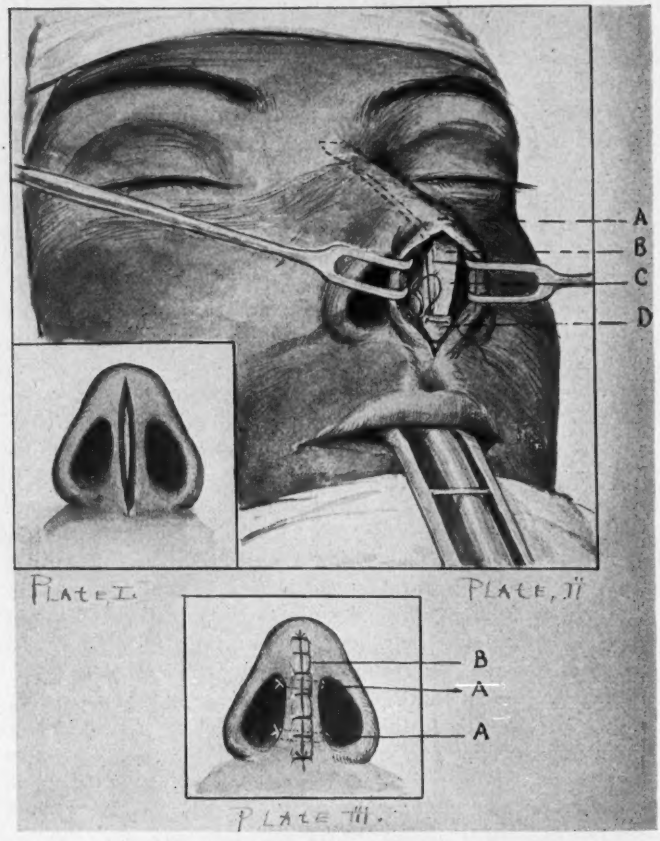


Plate I, II, III.

Columella incision, exposing the cartilage of the septum.

A. The long leg of the graft.
B. Perichondrium intact for the purpose of holding the long and short legs of the graft together.
C. Short left of graft, to support the columella.
D. Perichondrium intact, with a small Lane intestinal needle passing through the loose tissue of the philtrum and perichondrium, for the purpose of securely anchoring the short leg of the graft to the deep area of the upper part of the philtrum.

A and A'. Mattress sutures.
B. Continuous lock stitch of horse hair.

the short end of the angulated transplant firmly into place, by suturing it to the deep tissue of the upper part of the philtrum, thus preventing tension upon the sutured columella, and later a flaring outward of the graft in this area. Two mattrassed sutures of fine silk worm material now close the columella. The raw surfaces are carefully and accurately coaptated with a lock-stitch of horse hair. Both

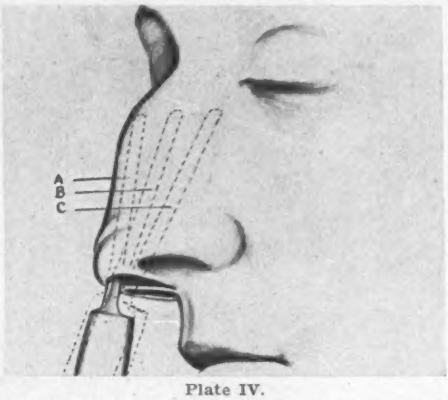


Plate IV.

A, B and C. Showing method of freeing tissue of nose in case of hump.

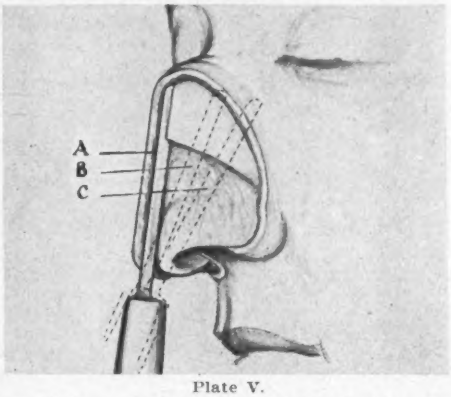


Plate V.

A. Incising periosteum. B. Separating mucous membrane. C. Separating periosteum.

pieces of packing are now removed from the nostrils. No bandaging is necessary as a rule. The external wound is kept clean with a 25 per cent solution of alcohol and scabbing is prevented by the application several times daily of sterile liquid albolene. The sutures are removed on the fourth day and after due course there is very little scarring, if any.

Humps and Deflected Noses: The same incision is made in the columella as the one described, but it is not necessary to extend the incision to the deep tissue of the philtrum, nor does one separate the septal membrane. The loose tissue of the nose is freed as before on each side. An incision is then made through the periosteum on the uppermost part of the hump and parallel to the nasal bridge. A

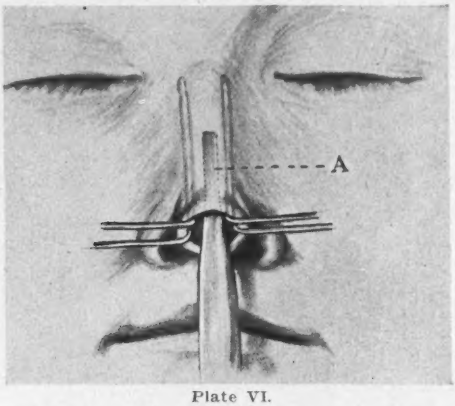


Plate VI.
A. Chiseling off the nasal hump.

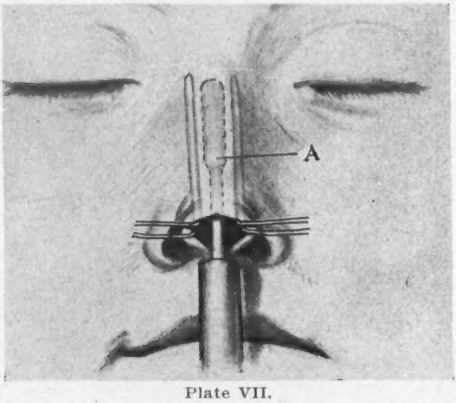


Plate VII.
A. Polishing bone with a fine Joseph's rasp.

septal elevator separates the periosteum from either side of the nasal bones. The bony hump, which is incorporated with the nasal bone, is removed by using a special chisel of my design. After the hump is removed the raw surfaces are polished, using a fine Joseph rasp. If the cartilage is to be removed, this is accomplished by the use of a sharp, strong, angulated Makenty knife. It is necessary

at times to remove in part the lateral nasal cartilage, the anterior upper border of the septal cartilage and finally the tip of the lateral crus of the greater alar cartilage (see schematic drawing A. B. C.). Coagulated blood, chips of bone and cartilage if present are expressed. A pressure bandage is applied upon each side of the nose

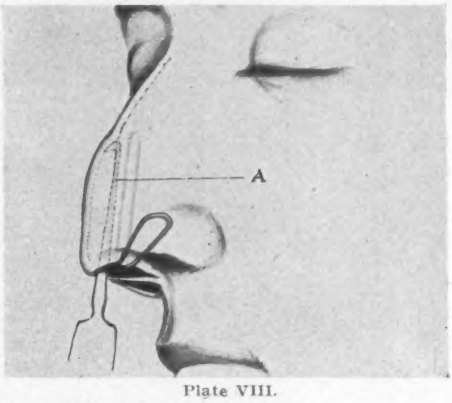
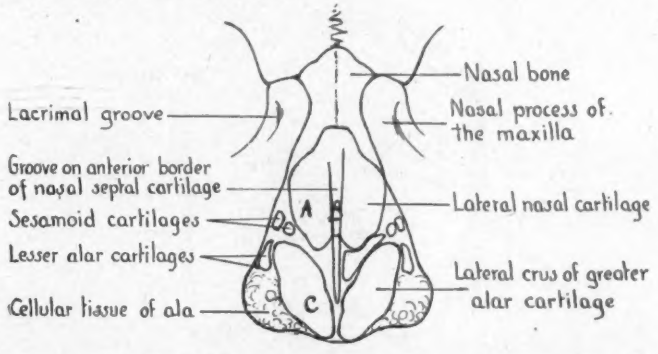


Plate VIII.

A. Removing cartilagenous part of hump.
See schematic drawings A, B and C.



for 48 hours. The columella incision is closed by interrupted horsehair sutures.

As for the deflection of the nasal bones, bridge and thickening of the nasal process of the maxilla, the same initial incision is utilized. After the loose tissues of the nose are separated, the mucous membrane, lining the nasal bone and the nasal process of the maxilla, is separated on the one hand and the periosteum on the other. The positive side of the deflection is removed with my No. 1 chisel, or corrected by wedging. Whether the one or other method is used, is

left to the judgment of the operator, who is guided by the extent of the spring and thickness of the positive side. Many times there is considerable thickening of the nasal processes of the maxilla, producing a very wide upper nose, which is generally bilateral. This must be removed with a chisel or crushed inwards after chiseling.

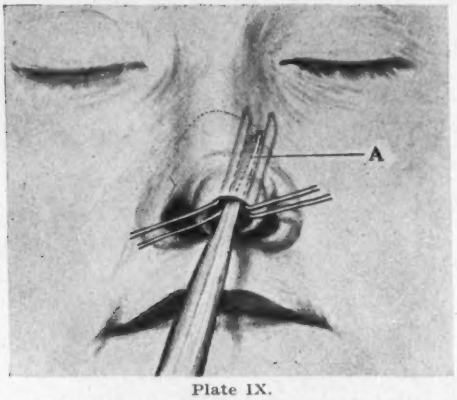


Plate IX.

A. Using special chisel for the removal of the nasal bone or the nasal process of the maxilla.

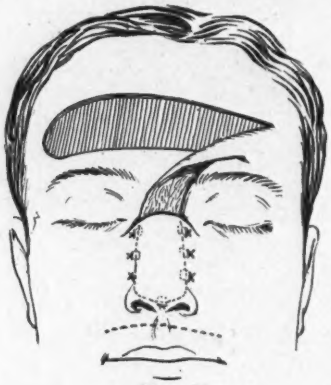


Plate X.

Pedicated flap of forehead skin, to replace the loss of mucous membrane in the syphilitic nose.

If the bone is removed, the periosteum in due course becomes thickened, which acts as an excellent support. We will now find that the spunk, so to speak, is taken out of the nose, which can now be readily moulded and set. The columella wound is now closed as described heretofore. An external pressure bandage is properly and evenly applied to both external nasal surfaces for five days.

The Plastic Repair of the Syphilitic Nose: As for syphilis, which is the peace time destroyer of the nose, I feel certain there is not a case which is not amenable to the methods which I am about to describe. One of the essential advances in the repair of the syphilitic nose is the universal recognition that the lining is as essential as the external covering. There are three essential requisites in the

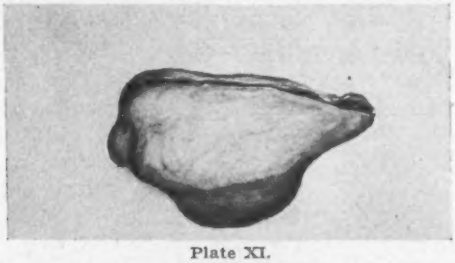


Plate XI.

Modeled stent, which is covered by a Thiersch graft, raw surface outermost.

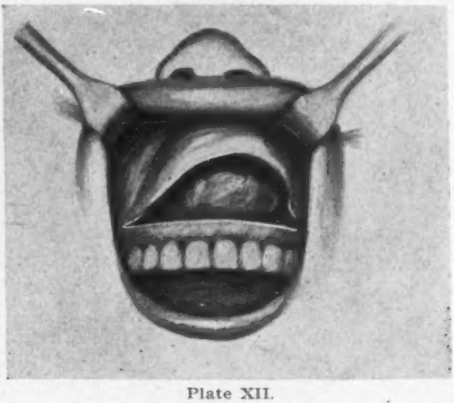


Plate XII.

Modeled stent covered by a Thiersch graft for the purpose of epithelizing the nose, to provide a lining.

proper performing of a rhinoplasty, namely, a proper lining, a covering and a supporting frame.

The lining may be provided for by the use of a skin graft of the Thiersch variety, wrapped around a model of Stent, and either sewn into place or held in loco with a dental splint, or whatever apparatus one chooses to use. If the loss of mucous membrane is extensive one may employ to better advantage a pedicled flap of forehead skin; this insures against contractures, which may take place if one attempts to repair an extensive loss with the use of a Theirsch graft. The covering of the nose may best be undertaken by employing skin of the forehead, as this best matches a normal

nasal covering. The supporting frame should be of chrondal cartilage.

If one chooses to replace the loss of mucous membrane with a Theirsch graft, the following technic is employed:

An incision ½ inch above the upper incisor teeth and 3 inches in length is made through the mucous membrane down to the bone. The whole is reflected forward, which exposes the intranasal cavity. If the septum is intact, the scar tissue on both sides of the nose is excised and oozing controlled by temporary packing of strip gauze. A model of Stent is made of the parts and a Thiersch graft taken from the inner aspect of the right thigh is wrapped around the modeled Stent. The mould is removed from the 7th to the 9th day, leaving the skin firmly adherent. Two days after the removal of

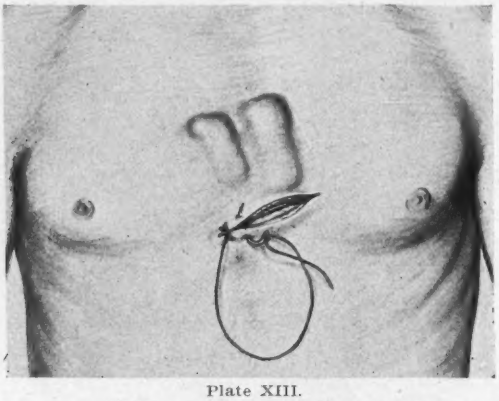


Plate XIII.

The excess of cartilage is hoarded beneath the skin of the chest.

the Stent, the nose is gently irrigated daily for several days. If the loss of mucous membrane is extensive, with the loss of intranasal structures, this is best repaired by a pedicled flap of forehead skin. A curved incision is made through the skin of the upper part of the nose, with its height on a level with the cantral line, extending through the deeper structures. The tissues are reflected forcibly backwards by an assistant which exposes the intranasal cavity. All scar tissue is removed, but occasionally the scarring is so extensive and in order to excise it thoroughly the lip incision is also utilized. After all scar tissue is excised a pattern of the exact loss is taken and a pedicled flap of forehead skin is now brought down after the pattern, twisted upon itself, without producing torsion and sewn into the nose. If the flap successfully takes, that part which is not utilized is returned to the forehead after three weeks. Later a bridge of chondral cartilage is inserted between the flaps.

THE NEW YORK ACADEMY OF MEDICINE.

SECTION ON OTOLOGY.

April 14, 1922.

Acute Mastoiditis and Peri Sinus Abscess Without Ear Symptoms. Dr. Harold M. Hays, New York City.

J. K., a little girl of four years, came down with grip about three months ago. She ran a moderate temperature up to 102° for two or three days, with no evidence of any ear involvement. At the end of that time, a slight rash appeared on the body which was finally diagnosed as scarlet fever. The temperature during the early stages of the scarlet fever ranged between 102° and 103°, but the disease was mild in type in every way. Physical examination at this time showed no evidences of any trouble in any part of the body, with the exception of a slight redness of the ear drum on the left side. At the end of the first three days the temperature returned to normal and remained normal for about three weeks. Routine examinations of the child were made by the pediatrist at frequent intervals, but the child was so well that there seemed to be no cause for worry. At the end of three weeks, on making one of his routine calls, the pediatrist found that the child's temperature that day was 103° and that she had an enlarged cervical gland which was quite tender on the left side of the neck, immediately below the mastoid bone. The child did not complain of either ear at this time, but the pediatrist, who was an exceptionally careful man, made an examination of the ear. He was able to see the right ear drum plainly, but it was impossible to get a good view of the left one because the canal was so swollen that it was impossible to insert a speculum. Pressure over the mastoid elicited tenderness near the tip, which one may have thought was associated with the enlarged and tender cervical gland. I was called in consultation that afternoon by Dr. Bass, the pediatrist, and found the following: a child who was beginning to desquamate, who had a temperature of 103°. The child did not look ill and did not complain of any pain. Examination showed the throat slightly congested, the right ear drum and canal normal. Examination of the neck showed a large cervical gland, about the size of a lemon, on the left side, which was not at all tender and which showed no evidence of fluctuation. Examination of the canal showed that it was almost entirely occluded by some swelling outside of the canal itself. There was absolutely no tenderness to the canal wall, which could readily be probed with an applicator. No matter how much one attempted to clean out the canal, it was impossible to see the drum. Pressure over the mastoid bone showed that there was considerable tenderness, extending from the tip upward and behind the sinus. There was no edema, no evidence of swelling of any kind and absolutely no discharge from the canal itself There was no hearing to the watch or whispered voice.

Having seen a case of stenosis of the canal which was caused by a mastoiditis, without any other symptoms, two years ago, I was immediately suspicious of a concealed mastoiditis. I immediately stated that the child must be operated upon, but that further evidence was possibly necessary, and that there would be no danger in waiting until this evidence was obtained. Within a few hours an X-ray picture of the mastoids, on both sides, were taken. The pictures showed very plainly that there was complete destruction of the entire mastoid on the left side. Dr. Whiting was called in consultation. He corroborated the finding. The following day the child was operated upon. The usual operation was performed. As soon as the mastoid cortex was opened

up there was immediate flow of pus and further investigation showed that there was entire destruction of the entire mastoid, extending well beyond the sinus. A peri sinus abscess was present to the extent of about half an inch and a small portion of the dura was exposed. This child was given the anesthetic while she was asleep and the operation performed in such a way that she was disturbed as little as possible and returned to bed, with the result that she did not know at any time that an operation had been performed upon her ear. A small gauze drain was inserted into the antrum and the rest of the wound closed up. Right after the operation, the temperature returned to normal and no unusual symptoms suggested themselves during the convalescence. Within ten days the wound was entirely healed. The canal wall assumed its normal appearance and the hearing returned to normal.

This case is unusual for a number of reasons. In the first place, there was never any discharge from the ear canal. Secondly, there was never any complaint of pain in the ear. Thirdly, there has been no signs of inflammation in the middle ear with the exception of a slight tinge of redness a few weeks before, when the original infection took place. That such infections can occur frequently there is no doubt, and it is only by repeated experiences of this kind and the additional evidence shown by the X-ray that one is able to say positively that a mastoid infection is present. I have seen a number of such cases since I reported my original one, two years ago, and I feel that one must be on the lookout for unusual cases of this kind at any time.

"Total Deafness Due to Trauma, With Normal Static Labyrinthine Findings. Report of Two Cases." Dr. Samuel J. Kopetzky and Dr. Alfred A. Schwartz

(To be published in a subsequent issue of THE LARYNGOSCOPE.*)*

DISCUSSION.

DR. SEYMOUR OPPENHEIMER remarked: "The longer we live the more we learn," and said that the man who had a case of this sort had quite a battle to fight with the attending physicians who, as a rule, had very little knowledge of the indications for an operation, and only considered a case as operative where the symptoms were so marked that there was no question, and it was a task to convince them of the necessity of an operation. Of course, at the age of four, one could get findings that were of value, but in a younger child the radiographic indications might be misleading and dubious. Many radiographs of small children showed a haziness of the mastoid without there being any involvement which required surgical interference. The only explanation he could offer of such a case, as Dr. Hays presented, was that some granulations had formed in the aditus leading from the mastoid to the middle ear space which had effectively blocked off communication between the two; therefore, no perforation of the drum membrane had taken place and no suppuration was evident. Cases of this kind were interesting and were just the type that should be reported and discussed in order to put us on the qui vive.

DR. LEDERMAN cited a similar case recently seen under the care of a colleague, which was supposed to be a case of primary mastoiditis, as considerable destruction was found at operation. The course of the infection was probably through the middle ear, which had cleared up, as no destructive symptoms were observed in this region. It is in this class of cases that an occlusion of the aditus takes place, walling off the cavity of the middle ear, but the infection in the mastoid cells progresses. He had never seen a case that he could claim as a primary mastoiditis without previous middle ear involvement. Direct trauma to the mastoid process may possibly give rise to an inflammatory process in this region.

DR. HAYS replied that some of these cases brought up a number of interesting points, which he hoped to be able to dwell upon further in the future. Referring to the remarks of Dr. Oppenheimer and Dr.

Lederman, he said that there was probably never a case of primary mastoiditis except where there was direct traumaism to the bone. In this case, probably the attic became walled off in such a way that the middle ear was free from involvement. An interesting point was that within a year and a half he had had three of these cases which showed very little upon which one could rely, in making a diagnosis of mastoiditis. One case was that of a young man who, eight weeks before, had had a discharge from the ear. Six weeks later he returned with no temperature or pain, but with a feeling of fullness in the ear. After observing him for a while, he was sent off to play golf. Later an X-ray picture was taken and the mastoid was reported to be completely destroyed. At operation, not a particle of the mastoid was left. The patient developed similar symptoms on the other side, but these proved to be of no significance. In other words, if you get an occluded canal which is not tender, you can make up your mind that something is pushing the wall forward, and there is usually some mastoid involvement.

In another instance a young woman was seen who had had grippe five weeks previously. When seen she complained of a slight feeling of fullness in the ear. X-rays were made of the teeth, sinuses, etc., and the report came back that the mastoid was cloudy. Dr. Whiting was called in consultation, and it was decided best to leave the ear alone. A few days later she developed tenderness over the mastoid, with an absolutely normal middle ear. It was finally decided to bo an exploratory mastoid operation. On opening the mastoid cells nothing was found until the tip was reached, when one encountered necrotic bone, but no pus was found. When one has seen three or four of these cases, it makes him realize that there must be a number of them that do not give the usual symptoms and that he must be on the look-out for them, for if such cases are allowed to go on without operation, one is likely to have a sinus thrombosis in the end.

Unilateral Total Deafness. Dr. A. A. Schwartz.

DISCUSSION.

Dr. Gottlieb agreed with Dr. Schwartz in reference to the first case that most likely the injury was of central origin, for it was improbable that the individual would past point spontaneously and have normal vestibular reactions on both sides without an injury to the brain stem or cerebellum. However, one cannot overlook the possibility of a peripheral and central lesion occurring in the same case, for it has been shown by J. Gordon Wilson, that microscopic sections of temporal bones derived from cases that had died from shell shock exhibited hemorrhages in various parts of cochlea, whereas the semi-circular canals were surprisingly free from these lesions. Cases of this character are not very rare, and if one is sufficiently interested in the subject, they may be easily found in the various clinics and in private practice. Dr. J. J. Cotter referred a case to me, in which the patient said he was deaf, but on a thorough examination found that he was malingering, but he had a definite syndrome referrable to an injury to his brain stem and cerebellum. He was struck on the head with a sledge-hammer. All the information obtained on examination could have readily been accounted for by the blow received, but he gave a strongly positive Wassermann reaction and we are now unable to decide whether some of his symptoms might not be due to syphilis.

In concluding, I would like to ask Dr. Schwartz if an X-ray of the skull had been made in the first case.

Dr. Wilson referred to a number of cases of shell shock in which injury to the cochlear was found at autopsy, and on section definite hemorrhages were found in the cochlear, leaving the static labyrinth free from traces of hemorrhage, and said that it seemed probable that in the second case, at least, the injury was of end origin. The subject was an interesting one and very few persons were studying it extensively, yet the amount of material was fabulous and anyone could find it in

the clinics or in his private practice. Dr. Potter had told him of a case with a similar syndrome, in which the patient claimed to have been hit on the head with a sledge hammer, but he tried to malinger on one side. He had definite symptoms of incoordination and it looked as though he had suffered an injury. The Wassermann reaction was * * * however, and that threw out all the conclusions, and they were still at sea about it.

DR. DANZIGER said that when in a case of trauma the tests show complete deafness and a normal vestibular apparatus, we are dealing with a ventral lesion. There is such an intimate connection between the two portions of the labyrinth that he could not conceive of involvement of one without the other. It was important to take an X-ray picture, not only of the mastoid, but of the whole skull, for in this way one might often discover conditions of great importance in the prognosis. A few years ago a young man was thrown from a horse. He was bleeding from the right ear. Tests showed a normal labyrinth; the X-ray picture showed a fracture of the bony canal that extended through the whole occipital bone. The parents were advised of a remote possibility of traumatic epilepsy in later life, as it is not necessary for a fracture to go over the motor area to cause epilepsy.

DR. LEDERMAN referred to a case which he had reported some years ago regarding the involvement of one portion of the labyrinth through trauma. The patient was a colored woman, 24 years of age, who had been shot with a 32 calibre revolver, six inches from the head. She was unconscious for three weeks, and afterward complained of severe vertigo, but the cochlear was functionating, as the loud voice could be heard and bone conduction was positive. She also had a facial paralysis. The ear was filled with a fibromyxoma, and suppuration was present. The patient was unable to stand or walk alone and had to be supported by some one. One could see the mark on the tragus where the bullet had gone through; it had passed through the canal and perforated the posterior portion of the drum, and could not be seen on account of the polyp that was filling the canal. When this was removed, a black mass was seen in the middle ear, which on examination with the probe gave a distinct metallic sound. The patient was told that nothing could be done locally, and a radical mastoid was advised and accepted. That was before the days of the Barany tests, so no vestibular tests were made. The lead of the bullet was spattered over the posterior portion of the middle ear and over the facial aqueduct and portion of the horizontal semi-circular canal. The bullet could not be removed in toto, but 7 grains of lead were chiselled and curetted away. Not alone did the facial paralysis improve, but the symptoms of disturbance of the semicircular canal subsided in two weeks and the patient recovered with good hearing. One might have an involvement of one portion of the labyrinth and yet the other be not disturbed.

DR. GUTTMAN said he understood from the history that there was no doubt of the traumatic origin of the lesion, which was located either in the labyrinth, or in the cochlear nerve, or the central nuclei. It was very difficult—or almost impossible—to make a positive diagnosis regarding the exact localization. He doubted whether Dr. Schwartz would insist that the vestibular labyrinth was normal. There might be a possibility of some involvement of the vestibular nerve. It was well known that the cochlear nerve was much more easily injured than the vestibular nerve. It would be interesting if Dr. Schwartz would tell how he demonstrated the total unilateral deafness. He probably—in order to eliminate the good ear—used the Barany noise apparatus, but this apparatus eliminates not only the hearing of the good ear, but it diminishes also the hearing in the ear which is to be examined. By the use of the tuning forks he could not prove a unilateral deafness either, as this test simply shows that there is no bone conduction on this side, and in examination with the high pitched tuning forks he could not exclude the good ear.

DR. SCHWARTZ said that the object in presenting the paper was to show that there are certain cases of total deafness with normal vestibular function. Of course, the location of the lesion was an academic problem, yet it seemed quite clear that the lesion was not cochlear and not in the static labyrinth.

Referring to the case quoted by Dr. Gottlieb, which resembled the first case, Dr. Schwartz said that the Wassermann test had been made in both cases and was negative. Of course, there was no question but that an X-ray should be taken in injuries of the head, but one of the cases had come for treatment a year after the injury, and the other one seven years after.

Replying to Dr. Guttman's remarks, he said that the Barany tests had not been made, but that they had relied upon tests made with two series of forks. Of course, the question arose whether the patient might not have small islands of hearing, but judging from the local aspects and from the tests made, the patients were perfectly deaf.

DR. SEYMOUR OPPENHEIMER said he did not think these cases were at all rare. He could not recall the exact number he had seen, but probably twenty within the last four or five years, among a series of several hundred cases referred from the Department of Labor or Liability Companies for a condition of the ear after a head injury. There were probably twenty of these cases with complete deafness that did not show any disturbance of the static labyrinth. It was the same type of injury in civil life that must have occurred by the thousands in war time. The examination of many individuals now who had suffered from violent concussions from explosives while in the service would probably reveal many cases that did not involve the static labyrinth, but had a complete involvement of the cochlear portion, or a very mild involvement of the static portion, which cleared up while the cochlear portion remained permanently involved.

DR. KOPTESKY suggested that if Dr. Oppenheimer had twenty such cases he should put them on record. The particular case reported by Dr. Schwartz did not come from the compensation commission, but was a case that involved quite a legal question, and after the man was examined he was thought to be malingering because his static labyrinth reacted normally to all tests. He had suffered from shell shock and had not suffered from concussion. Gordon Wilson makes a differentiation, but we could not put our hands on any case at the time of examination where a man could not hear and at the same time answered perfectly to the labyrinthine tests; and the conclusion drawn from the case could only be based on theoretical grounds that there was a hemorrhage in the cochlear and destruction of that part of the labyrinth. This had been shown experimentally, and why could not it happen through trauma? A record of 20 cases would be invaluable from a legal standpoint and might prevent injustice to many persons who claimed deafness and in whom the tests show normal function, statically, and who might therefore be classed as malingerers.

Mastoiditis and Facial Paralysis Associated with Unexplained Temperature for One Month. Dr. Wesley C. Bowers.

History: G. H., aged 10, was admitted to St. Luke's Hospital on April 7, 1921, with a history of a run-down physical condition and a temperature between 99° and 100° daily, for one month. Two days previously, the boy had developed a complete facial paralysis on the right side. *He had never had pain in, or discharge from, the ears.*

Physical examination showed the right side of the face completely paralyzed. The right drum membrane was scarcely visible, owing to the sinking of the canal wall at the fundus. There was no discharge. The left ear was normal. The temperature was 100°. Myringotomy was performed and straw-colored fluid obtained. X-ray showed the right mastoid cloudy.

Operation disclosed a mastoid filled with granulations and pus, with considerable necrosis about the antrum and tip.

Clinical Course: The facial paralysis cleared up in about two weeks and the boy made an uneventful recovery.

Conclusions: An unexplained temperature always demands a competent examination of the ears. (This case had been examined by one who did not appreciate the changes in the drum membrane.) The prognosis for recovery from facial paralysis is good—if operated early.

Sinus Thrombosis for Nine Weeks Without Symptoms. Dr. Wesley C. Bowers.

History: J. S., aged six, March 30, 1921, developed pain in the right ear, with a temperature of 102° for several hours. I performed a myringotomy on the right side. The family physician reported that the ear discharged for several days and then seemed to clear up entirely. The boy seemed in excellent halth for nine weeks, when he again developed pain in the same ear at night, which disappeared before morning. That afternoon I saw the child. He had a blister in the lower part of the drum membrane and the landmarks were visible. I believed it best to do a myringotomy, as his temperature was 102°. There was no mastoid tenderness. The ear, following the myringotomy, discharged very little. Two days later he again began to have pain in this ear. I found his temperature 103°, the mastoid very tender, the ear drum reddened throughout, but landmarks visible and no bulging. Contrary to my custom, I did a second myringotomy. Needless to say, the temperature was not affected by the myringotomy and the pain persisted for another twent-four hours, when it mostly disappeared. The temperature the following four days ranged between 100° and 103°. The boy seemed to be improving rapidly, acting and appearing as if better, and sleeping well at night. Seven days after the myringotomy his temperature went to 105.1°. With this temperature he seemed to feel perfectly well and happy. There was a very moderate watery discharge from the ear, the mastoid tenderness was just as bad as six days before, the landmarks were still visible, there was no sinking of the canal wall, no bulging of the membrane.

Operation showed the mastoid entirely necrotic, with a large cavity posterior to the antrum filled with granulations and an area of dura, one-half inch in diameter, covered with granulations. The sinus plate was large, white and perfectly healthy in appearance, except that it was very thin. Because of this thinness I decided to remove the bone over the sinus. On so doing, I was surprised to find free pus. I had entered an abscess cavity about three-quarters by one-half inch, filled with granulations and pus. After curetting away the unhealthy granulations I was unable to identify the sinus. A small hole, apparently in the dura, was noted in the lower part of the cavity. On putting a probe into this some bleeding was produced. In other words, I was in the sinus. I realized that I had a sinus thrombosis with obliteration of the external wall of the sinus for a distance of half an inch. In the upper part of the cavity I found the upper end of the sinus in a similar manner. I enlarged the openings, obtaining free bleeding from both ends. I then tied off the jugular vein. The boy made a complete though stormy recovery.

Conclusions: This case illustrates how absolutely helpless we may be at times. In this case I had never suspected a sinus thrombosis which had evidently existed for nine weeks, it being impossible for so much destruction to take place in one week. The child had no chills, no sudden rise of temperature, no rise—during the present attack—above 103° until the day of operation, when it suddenly went to 105°. He had a septic temperature ranging between 100° and 103° for several days before operation. With a temperature of 105°, this boy seemed and acted perfectly normal, and I suspect that, had his temperature been closely watched following the original attack of otitis media, it would have been found that at times he had a very high temperature.

I believe that the temperature should be watched for at least a week following every attack of otitis media, no matter how few the symptoms.

Chronic Mastoiditis with Abscess at Petrous Tip. Dr. Wesley C. Bowers.

History: V. E., aged 18, was admitted to Bellevue Hospital, November 21, 1921. The patient spoke no English; the history was obtained from her brother. The chief complaint was vomiting, dizziness and headache. The present illness had begun about two months previously, when the patient was in Ellis Island Hospital. At this time she had a discharging left ear, which cleared up. Later her right ear began to discharge. The right cleared up and the left again began discharging. This time the discharge from the left ear persisted. Three days before admission she began having pain and soreness behind the left ear and in the left side of the head. The night before admission she vomited, felt dizzy and had increased pain on the left side of the head. She had no previous trouble with the ears.

Physical examination showed a young adult Greek girl who looked very acutely ill, very apprehensive and appeared to be in considerable pain. The eyes were negative, except for a rotary nystagmus to the right. The cranial nerves were negative; there was no rigidity of the neck or other nerve symptoms. Ears: the left showed profuse discharge, a sinking and edematous upper wall, a very narrow fundus and some mastoid tenderness. Caloric gave no reaction on this side. It was impossible to test the hearing or make other examinations satisfactorily, because of the ignorance of the patient. Blood count: WBC, 8000; Polys, 69 per cent; Lymph., 30 per cent; Eos., 1 per cent. Temperature, 103.2°; pulse, 120; respirations, 20.

Findings here indicated that we had an acute mastoiditis with either an acute suppurative labyrinthitis, or a cerebellar abscess, or both. Immediate operation was advised because of the serious condition of the patient.

Operation: The usual incision was made over the mastoid, the periosteum elevated. There was no perforation through the cortex. The mastoid was found to be entirely broken down with a considerable number of cells posterior to the sinus. A small fistula led inward above the semi-circular canals, from which pus came under pressure. Upon enlarging this opening, the fistula was found to enter a cavity internal to the labyrinth and anterior to the internal auditory meatus. This cavity contained a considerable amount of pus under pressure. Bone was removed over the dura of the middle fossa and posterior fossa with the hope of getting better drainage. Bone was also removed over the sinus. The bone in the angle between the posterior and middle fossae was removed. There was a small opening in the dura of the posterior fossa. The upper part of the labyrinthian capsule was removed in order to get drainage of the cavity in the petrous bone. The facial ridge was lowered and the middle ear cleaned out. This was found to be filled with granulations and necrotic bone. The wound was packed wide open.

Spinal tap, made at time of operation, showed fluid under moderately increased pressure, and turbid; cell count, 63 per cm. Culture from the mastoid wound showed staphylococcus aureus; culture from the spinal fluid was negative.

Clinical Course: The temperature came down to normal in three days and remained so The patient developed a partial facial paralysis on the left side several days after operation, which cleared up in about ten days. Headache and all other symptoms disappeared.

Secondary Operation: As I had not attempted a thorough cleaning out of the radical cavity, had not cut a meatus and had left the wound wide open, because of the necessity for draining the abscess cavity and because of the condition of the patient, I did a secondary operation 38 days after the first one.

The old cavity was cleaned out, the middle ear re-formed, some more bone removed over the ridge. The petrous cavity now appeared to be

perfectly clean and filled with apparently healthy granulations. The meatus was cut and the posterior wound closed.

Clinical Course: Following the secondary operation the patient complained of some frontal headache. Twenty-four hours post-op., she again showed some facial weakness on the left side. These symptoms soon disappeared and she made an uneventful recovery.

DISCUSSION.

DR. KAHN, referring to the case with continuous temperature for a month, said, especially in children, that he did not believe this was so unusual. He cited a case in a child seven years of age who ran a low temperature (99 to 100) for a long period of time, both before and after a mastoid operation. The child was in perfect health and gaining weight and progressing normally.

He understood that in the second case reported there were no positive symptoms, but only mastoid tenderness. In such cases it was important to take an X-ray early, for that was practically the only guide in such cases. Of course, where the X-ray showed an involved condition, one should explore.

Case of Persistent Post-Influenzal Pneumococcaemia, Complicated by Bilateral Mastoiditis; Operations; Transfusions of Immunized Blood; Recovery. Dr. Daniel C. Dougherty.

R. V. H., an infant, aged 11 months, was referred by the family physician on January 30, 1922, with a diagnosis of bilateral suppurative otitis media and left mastoiditis.

The accompanying history was as follows: Had been healthy from birth until December 13, 1921, when he developed bronchial and gastro-enteric disturbances, followed on January 3, 1922, by eruptive manifestations of measles. The enteric condition persisted for one month; the cough remaining after the subsidence of all other symptoms. The child continued very restless with a temperature ranging from 99.2° to 102°, but as it was teething, no stress was laid on this condition. A change in physicians was made and on January 23, both ear drums were incised; the next day the left re-incised, and on the 28th, both ears again opened. On January 30, he was sent to the city for operation.

Inspection showed a well developed baby, weighing 22 pounds, apparently suffering intensely, feverish, restless and crying incessantly. A pediatrician called to examine the chest and abdomen reported negative results.

Examination of the nose, throat and ears showed an acute rhinitis; the tonsils and pharynx highly inflammed and septic in appearance, being covered with a muco-purulent secretion, which also filled the rhino-pharynx; a suppurative otitis media with a slight discharge on the right side and, on the left, a marked mastoiditis with profuse discharge from the canal. Temperature, 104.2°; respirations, 24; pulse too rapid and weak to count.

A smear from the ear discharges of both sides was reported as consisting mostly of pus cells and a gram positive diplococcus, probably pneumococcus. The subsequent report from the culture was positive for pneumococcus and staphlococcus. A culture of the throat secretion gave the same result. Blood count, leukocytes, 47,600; polys., 60 per cent.

A simple mastoidectomy was done, the mastoid being found to be of the hemorrhagic type; no exposure of dura or sinus. The wound was packed lightly with a strip of plain gauze and sutured, leaving a small opening at the lower end of the incision

Immediately after operation, the temperature dropped to 101°, remained stationery for 24 hours and then rose to 104.3°, fluctuating between 102° and 104° for seven days and touching 105° on the fourth day. Pulse, 140 to 160; respiration, around 40. During this time the blood counts were, respectively; leukocytes, 30,800; differential, 70 per cent; leukocytes, 24,400; differential, 61 per cent; leukocytes, 23,600; differential, 67 per cent; leukocytes, 26,000; differential, 44 per cent; leu-

kocytes, 25,000; differential, 79 per cent. A specimen of blood sent to the laboratory February 1, the second day after operation, was reported positive for pneumococcus, group II; the colonies being numerous, almost over-lapping.

On February 5, with a hemoglobin of 48 per cent Dare, the patient received 250 cc. of the mother's blood by the Unger method of direct transfusion and the inoculation of a donor was begun. At the time of transfusion the temperature was 104.3°, and an immediate drop to 101° was but temporary, rising to 104° and running for the next four days from 100° to over 104°, but in broken curves; pulse, 120 to 140; respiration, 30; blood counts being leukocytes, 18,600; differential, 62 per cent, and leukocytes, 24,000; differential, 60 per cent.

On February 10, 320 cc. of blood from the partially immunized donor was given without apparent results, the temperature continuing the same septic course, the blood counts being leukocytes, 26,400, with 52 per cent differential and 28,600 with 63 per cent differential, and the culture remaining strongly positive.

On February 14, mastoiditis having developed in the other ear, simple mastoidectomy was performed. This did not differ from the first operation, the mastoid being also of the hemorrhagic type. The incus was found lying loose on the floor of the antrum just inside an enlarged additus, an ossiculectomy having probably been done by one of the incisions for paracentisis. A post-operative drop in the temperature to 99° was followed by an immediate rise to 105.2°, and a fluctuating range of 101° to 105°. On February 18, 20 days after the first operation and four days after the second, the blood count being leukocytes, 44,800, with 70 per cent polys., and another culture having been reported positive, 440 cc. of blood from the immunized donor was given; his phagocytic index having risen from one at the last transfusion to nine. At the time of the transfusion the temperature was 105.3°, and a sudden drop to 99° was followed by as sudden a rise to 104.3°. This transfusion was followed in five days by another of 440 cc. from the same donor. The temperature immediately rose from 100.2° to 106.3°, falling in eight hours to 99°, where it remained until the discharge of the patient, ten days later; the pulse averaging 112 and the respiration, 28. Blood counts, leukocytes, 20,000; differential, 65 per cent, and leukocytes, 16,800, and differential, 32 per cent. The blood taken three days subsequent to the transfusion was negative after 72 hours in plain broth and in glucous broth; in plain agar plate and in glucous agar plate.

Both operations were followed by a septic cellulitis simulating erysipeles, starting from a point below the mastoid dressings and spreading upward toward the wound, more pronounced on the side first operated upon, this fact probably being due to the influence of the transfusion before the second operation. This condition endured but a few days.

Both the third and fourth transfusions were followed by an erytherma lasting but a few hours; the general systemic reaction following the latter was alarmingly severe, but of short duration

The interesting points in this case and the reasons for thus reporting in detail ar the persistence and unusual nature of the blood infection; the difficulty in definitely locating the focal source, amounting practically to an impossibility; the erratic range of the temperature and of the blood count, the strong temptation to depart from conservatism and resect or at least ligate the jugular in the hope that the focus was in the lateral sinus; the unusual treatment employed, three transfusions of immunized blood, and finally, in the fact that the patient made a perfect recovery.

The first thought was, naturally, that we were dealing with a pyelitis or a thrombus of the sinus—the former was ruled out by urinary analysis. Regarding sinus thrombosis, the physical signs of jugular phlebitis were absent and the extremely high blood count was a contraindication; the character of the infection, however, was the deciding factor; no report of true pneumococcaemia has ever appeared in the

literature. In 1912, Lipman drew attention to the fact that the two cases previously reported were of the pneumococcus, group III, which is in reality a streptococcus mucosa capsulata.

DISCUSSION.

DR. KAHN said, referring to transfusion in these infected cases, that several years ago he had read a paper before the Section, wherein he described certain experiments on dogs, where he transferred blood from one dog to another and back again. He named this procedure "continuous transfusion." He mentioned the fact that he had kept up the transfusion back and forth between the two dogs for an hour. He believed that the element of success in these cases lay in our ability to keep the toxemia below a poisonous dose. These experiments were, of course, done with animals. However, in the hospitals today we were taking advantage of what had been demonstrated by these experiments. Instead of using animals, two or three hundred cc's or more of blood were taken from infected individuals and replaced by a like quantity from a healthy donor, thereby keeping the toxemia below a poisonous dose. Doubtless in Dr. Dougherty's case, something could be said for immunized donors. Dr. Kahn, however, was inclined to believe that the greater success was due to the keeping of the toxemia below a poisonous dose.

DR. KOPETSKY said he wished to bear testimony from a limited experience with immunized donors. In his opinion the efficacy of the immunized donors did not lie in the dilution of the patient's infection. There was a distinct laboratory method of estimating the phagocytic power of a patient and a donor during an infection. As the donor was immunized it was found that the phagocytic power was distinctly increased. That was carried so far that Dr. Unger could differentiate between those whose phagocytic power was capable of being raised and those in whom it was impossible to raise the index. If you transfuse from a patient whose index it is impossible to raise you get dilution only. The proof of the pudding was in the fact that examination showed that the number of colonies was not increased, but was decreasing. It was easy to look over the chart, but if one had lived through the weeks that that chart represented, he would have known that it took a good deal of courage to sit tight during the crises, and Dr. Dougherty was to be congratulated on the results achieved.

DR. DOUGHERTY emphasized what Dr. Kopetsky had said about the action of the immunized blood. When it was decided that the child should be transfused, the mother's blood was typed and he was given 250 cc. without any result. There was, naturally, a dilution of the patient's blood and perhaps a little lessening of the action of the sepsis, but if so it was imperceptible. Even the partially immunized blood was ineffective and it was not until the donor was strongly immunized and his phagocytic index had been raised to nine that any results showed. The first fully immunized dose had a slight reaction, but it took the severe reaction that followed the last transfusion to show clinically that the immunized blood was having the desired effect. The temperature rose to 107°, fell in eight hours to 99° and remained down, and today the child is in normal condition in every way.

There is a warning in this case to those men who try to prevent mastoid complication by frequent re-opening of the ear drums; the first paracentisis should have been considered sufficient, no good came or could have come from the subsequent incisions. One of the incisions had done a perfect ossiculectomy, the incus had been dissected from the chain and dropped into the tympanic cavity.

Case of Mastoiditis Associated with Post-Auricular Abscess and Presenting Certain Interesting Points in Its Diagnosis. Dr. Alfred Kahn.

This young man was first seen by me on April 11, 1921. He complained of pain in the left ear. Examination showed only a furuncle. The drum, middle ear, Eustachian tube, were as normal. Hearing was

perfect. The mastoid did not demonstrate involvement. On this date the furuncle was excised, and in two days the patient reported himself as cured.

After a week he returned, this time demonstrating a swelling above the auricle; the middle ear, mastoid, drum did not demonstrate involvement. The swelling above the ear was opened under gas, giving a free flow of pus, and causing the surgeon to think that he was dealing with an abscess communicating with a mastoid bone fistula. With this in mind, a further, larger exploration was made the following day, the patient being under ether narcosis, but no fistula communicating with the bone below, or with soft tissues above, was found. It was a localized, super-auricular abscess. At this date the bone was not opened, as a mastoid was not suspected. The wound was packed with iodoform gauze, and his wound closed without any intercurrent manifestation. The patient returned to his business and was feeling in excellent spirits. On the 10th of June, the patient again returned. At this date he seemed to have lost his fighting spirit, and looked and acted, the doctor thought, somewhat like a neurasthenic. At this date the swelling had reappeared above the ear. The man was re-admitted to the hospital. Other than the localized super auricular abscess, the soft tissues were not involved. Owing to the man at this date having lost his otherwise buoyant appearance, and owing to the extreme depression which had manifested itself, and to the fact that everything else was excluded, it did not seem as though the examination would be complete unless the mastoid was actually X-rayed. The X-ray showed an unquestionable mastoid involvement. A mastoid incision was made, the super auricular abscess explored, but it did not communicate with the bone. It was entirely localized, separate and distinct from any bone involvement. The bone was badly involved and was gauged and curetted out. Here you have a case of mastoiditis without any sign of a mastoid, without any middle ear involvement, of about two months duration, associated with a large super auricular abscess, the super auricular abscess being distinct unto itself.

Case of Diphtheritic Mastoiditis Associated with Membrane in the Middle Ear, Eustachian Tube and Pharynx. Dr. Alfred Kahn.

This young man of twenty presented himself in November, 1921. He appeared very sick, and was so weak that he could hardly stand. He was pale and very toxic. He complained of severe headache and extreme pain in the right ear. There was free, abundant discharge of pus from the external auditory canal. The mastoid was excruciatingly tender. He cried out almost as soon as it was touched. He came to me through his family doctor with a diagnosis of acute mastoiditis, and with instructions to do an immediate mastoid operation. The patient did not complain of any throat symptoms, nor did it occur to anyone that there was a throat lesion. The patient himself did not complain of a sore throat. A thorough routine examination exposed a membrane high up in the post pharyngeal region, surrounding and including the Eustachian tube of the involved side. The patch was the size of a five cent piece. It adhered firmly and bled easily on attempt to remove. The external auditory canal was syringed. The drum was chewed up and a membrane involved the mucous lining of the middle ear. On attempt to remove, this bled freely. Ten thousand units of antitoxin was promptly given. On account of the extreme toxemia, the surgeon hesitated opening a large, raw area, and determined to wait another twenty-four hours to give the antitoxin time to act. He feared that a large exposed area would be a means of causing a possible further toxic involvement. The X-ray in the meantime showed a very badly involved mastoid. But after twenty-four hours the patient showed such a vast improvement in his general condition, and in face of the fact that the mastoid tenderness seemed not so intense, the operation was longer deferred. The improvement continued from day to day,

th young man made a complete recovery, and the operation was entirely avoided.

Dr. Kahn then made a comparison between the two cases reported by him. He called attention to the fact that under the X-ray in each case, both mastoids were cloudy, but that in the diphtheria case, the extremely tender mastoid, going with the rule, would usually have been operated. In this instance it was not, and the patient made a nice recovery. In the diphtheria case every operative indication was present. In the auricular abscess case, barring the X-ray findings, no mastoid indication presented itself, and yet, upon opening, the mastoid was badly involved.

Replying to an inquiry from Dr. Kopetsky as to what made him determine to go in in the one case and not in the other, Dr. Kahn said that in judging a mastoid one should not be governed by any hard and fast rules. To judge clearly one's mind should be pliable. Facts should be weighed against logic, and logic should alternate with facts. The surgeon should be very close to his case; he should be a part of it. He should almost be the patient himself. And yet he should stand apart from the case. A little detail, a change in temperature, a noticeable general change, either for better or worse, an unusual sudden condition arising, any of these little details might lead to the correct course.

In the diphtheria case he was tempted not to operate because although at first he was prepared to do an operation to a certainty, he had the intuition that antitoxin was the first line of defense. After twenty-four hours the patient's general condition cleared for the better, the mastoid did not seem quite so tender. If the mastoid lesion was progressive, the chances were that the general condition would have reflected it, but the general condition after twenty-four hours was markedly improved; therefore, the general condition probably reflected what was taking place in the mastoid. Accordingly, the surgeon held off, and his judgment was proven to be correct.

In the other case (the auricular abscess case) just the opposite state of affairs existed. The patient's general condition reflected a sudden change from the spirit of the brave to the depression of a coward. A sudden depressive form of neurasthenia in an otherwise high spirited patient reflected a change somewhere in his body. Everything was ruled out. He could not believe that a mere auricular abscess would cause such a marked change in his general condition. The X-ray was therefore determined upon, somewhat as a routine procedure, in order absolutely and assuredly to rule out mastoid disease. When the X-ray showed a cloudy mastoid, only one thing was left for the surgeon to do. An operation was then advised, and his reasoning was again found to be correct.

DISCUSSION.

Dr. Danziger, referring to Dr. Kahn's remarks about the positive X-ray plates, said: that the word "positive" did not mean much. If it meant a cloudy mastoid, it simply signified an existing mastoiditis, but not an operative mastoiditis. Only if the picture shows the breaking down of the unicellular bony walls and the formation of circumscribed cavities, one should make the diagnosis of operative mastoiditis.

Dr. Herzig asked if the patient had had a discharging ear before? The second case brought to mind one seen some fourteen years ago. The man had been operated upon for an abscess of the scalp, and the wound did not heal. Two weeks later he had an attack of mastoiditis and I took him to the hospital and operated him, and found that the mastoid had broken through the periosteum high up. Dr. Kahn's case might be a similar one, in which the periosteum broke down high up. I also had a similar case 8 years ago in a child, aged 6 years.

Dr. Wilson said he did not make it a rule to operate in every case that showed cloudiness in the X-ray picture, for there must be something beside that. He had seen a number of cases where the X-ray

showed cloudiness and yet the condition cleared up without operation. Only recently the X-ray pam said positively that operation was necessary, and yet the patient was discharged cured. There were no other symptoms except a discharging ear. While the X-ray is a valuable adjunct, it could not always be relied upon; that was particularly the case with the teeth, as he could testify to from an unfortunate personal experience. His dentist had taken out some teeth that were absolutely normal and no culture could be obtained from the cavities.

DR. DOUGHERTY emphasized the uncertainty of X-ray diagnosis, and said that if he were to go into every case in his hospital service in which the radiographer reported a cloudy mastoid, he would do nothing but operate. Probably seven out of ten of these pictures were misleading, although taken and interpreted by a very competent man. X-ray reports, like laboratory reports, should be considered as complimentary to the clinical symptoms and the diagnosis of the condition made upon a consideration of the whole.

DR. KAHN, replying to the question as to what he considered a positive plate, said he meant a cloudy plate. Replying to Dr. Herzog's question, he said there was no discharge whatever. There was no communication between the auricular abscess and the mastoid bone.

INTRINSIC CANCER OF THE LARYNX;

Usual Site of Origin, as demonstrated at 50 laryngofissures and its influence on Diagnosis, Prognosis and Treatment. St. Clair Thomson.* (British Medical Journal, June 25th, 1921.)

The text-books of Morell Mackenzie (1880) and Lennox Browne (1899) both expressed the view that the ventricular bands were the site of origin in a majority of cases. This was corrected by Semon (1896) who demonstrated that the vocal cord was the part attacked in a very large majority of cases. But Semon followed Virchow's teaching that malignant growths showed a preference for the posterior part of a vocal cord. The author gives the results of 50 cases in which the site of origin was not only viewed in the laryngeal mirror, but directly inspected during a laryngofissure. The disease was limited to the anterior third of a cord in 3 cases; to the middle third in 7 cases; and in not one single case was it limited to the posterior third. In 16 cases the anterior and middle thirds were invaded; in 3 cases the middle and posterior thirds; and in 21 cases the whole cord was attacked. In addition, he points out that the subglottic region, and its anterior third, was either the original site of disease, or was invaded by extension in 13 cases.

He arrives at the following conclusions:—

Conclusions as regards usual Site of Origin. 1. Intrinsic cancer of the larynx originates on the vocal cords or in the subglottic area.

*Epitome of a Paper read before the Summer Congress of the Section of Laryngology on June 3rd, 1921.

2. It has never been found in the posterior commissure (inter-arytenoid region), nor originating from the ventricular bands or the ventricle of Morgagni, in 50 cases carefully examined both indirectly with the mirror and by direct examination after splitting the larynx.

3. A malignant growth may originate on any part of a cord, but is more common in the central portion or anterior half than in the posterior area of the larynx.

4. As is now well known, an epithelioma originating in this region remains for a long time limited to the cord affected and the adjoining side of the larynx, but it may cross the anterior commissure, and, in later stages, it invades the arytenoid and the area to the outer side of it.

5. The inner surface of the cord may be affected primarily or by extension. The subglottic area may be invaded by a growth originating in a cord. But a cancer may also start below the level of the cords, in the subglottic area.

6. A subglottic cancer is much more common in the anterior than in the posterior half of the larynx.

Conclusions as regards Prognosis. 1. The superficial or projecting tumors of limited extent are the most favorable.

2. Those situated in the middle third or anterior half of the cord are more promising than those invading the anterior commissure in front, or the arytenoid region behind.

3. Growths embedded in a cord, or extending into it below an intact mucosa, are not so favorable.

4. An epithelioma extending along the inner margin of a cord is still less favorable.

5. Subglottic cancers are very unpromising as regards lasting cure by laryngofissure. They are frequently associated with impaired mobility or complete fixation of a cord.

Conclusions as regards Operation 1. In every case, however limited the growth, the entire vocal cord should be exercised from the anterior commissure up to and including the vocal process of the arytenoid.

2. The growth, with as wide a margin as possible of apparently healthy tissue all round it, should be removed in one mass; the excision should therefore go down to the lower edge of the subglottic area, above it should pass through the healthy ventricular band, and externally it must include the perichondrium lining the thyroid ala.

3. To facilitate this, the thyroid ala should be removed so that a laryngofissure is, really, a partial hemi-laryngectomy.

DR. JOKICHI TAKAMINE.

OBITUARY.

Dr. Jokichi Takamine.

Dr. Jokichi Takamine, an illustrious scientist, a modest and unassuming gentleman, a devoted lover of mankind, and deserving a niche in the Hall of Fame as the discoverer of adrenalin, died in New York City, on July 22, 1922, in the sixty-eighth year of his age.

He was born in Takaoka, Japan, the son of a physician. He graduated in Chemical Engineering in the University of Tokyo, a student of Professor Atkinson of Edinburg, and was sent by his government for further study in Edinburgh and Aberdeen.

Returning to Japan, he at once began the study of chemistry in agriculture, following the brilliant work of Liebig. The importance of this to Japan was enormous, for, owing to the centuries of cultivation, the soil was exhausted, and rice being the food of the nation, the problem was serious. His success can be measured by the fact that rice is now grown in Japan in three times the former quantities.

Dr. Takamine was appointed Chief Chemist and Imperial Japanese Commissioner for the Department of Agriculture and Commerce to the Cotton Centennial Exposition at New Orleans in 1884-85.

Returning to Japan, he erected the first super-phosphate works in 1887.

Experiments made in 1894 with Sake, a mild alcoholic beverage, led to the discovery of a diastatic enzyme which he called Takadiastase, and this has been used in large quantities as a starch digestant.

The discovery for which he was most famous and for which his name will always be revered, took place in 1900. The history of this discovery and its presentation has never been written, hence it seems appropriate in this memoir briefly to record it:

It had been announced that the active principle of the suprarenal gland had been isolated, to which the names Epinephrin and Suprarenin were given. Dr. Takamine did not believe that these preparations were the active principle and succeeded in producing needle-shaped crystals and named them Adrenalin. While he was convinced of the fact that he had been successful chemically, he naturally knew nothing of the medicinal value of his preparation. He therefore gave the writer several dilutions of his new active principle for clinical use. The results were so immediate and gratifying that a paper was prepared by the writer of this memoir detailing the effect of this new remedy on thirty-five cases.

This paper was read before the Section on Laryngology of the New York Academy of Medicine, the late Dr. Wm. Kelly Simpson being President, on March 27, 1901. Dr. Takamine and his associate, Mr. Keizo Woyenaka, were present and took part in the discussion, as did Dr. W. H. Bates, of New York City, who was the first to call attention to the value of the suprarenal extract. Until the time of the reading of the paper we had been using a decoction of the dried extract, filtered, made fresh as required, and it was a fine culture medium of potency that we were compelled to use and always with dread. With the new drug all these fears were dissipated. The honor of the first presentation of adrenalin in any medical journal belongs to the Philadelphia Medical Journal* (*Emil Mayer: Clinical Experiences with Adrenalin, *Philadelphia Medical Journal,* April 27, 1901, VII, 819). The article concluded as follows:

"My own experience having been so highly satisfactory with adrenalin, makes me feel justified in saying that in the isolation of the blood pressure raising principle of the suprarenal glands we are confronting an *epoch-making discovery.*

"The discovery of the active principle of other animal substances will be sure to follow in the near future and organotherapy will not only derive a new impetus but exactitude in the administration of these remedies will be sure to follow.

"We will no longer be compelled to use an animal extract of potency today and an utterly inert one at another occasion, but will always have the same remedy of known strength and power. Percentages of solutions would be exact in every instance, and in appropriate cases their administration by hypodermic methods would safely be employed with absolutely sterile solutions."

How prophetic these remarks were, we now after twenty-one years, can judge. Only those who practiced medicine in our specialty before that time can fully appreciate the importance of Dr. Takamine's discovery. Even at that time the original paper stated that the use of adrenalin to relieve nasal congestion and for its therapeutic effect when applied, was as important as its use in bloodless operations. Naturally many uses of the drug have since been added.

So important has the use of adrenalin become that its discovery ranks in medicine with that of the telegraph and telephone in physics.

Dr. Takamine presented a paper on his two discoveries, Taka diastase and Adrenalin, to the University of Tokyo, and was in consequenc awarded the degree of Doctor in Pharmacology in 1906 by that University.

He was decorated with the Fourth Order of the Rising Sun by the Emperor of Japan and by appointment of the Emperor was made member of the Royal Academy of Sciences.

Dr. Takamine married Miss Caroline Hitch, of New Orleans. His widow and two sons survive him.

The writer has been honored by a close and uninterrupted friendship with Dr. Takamine for over twenty-one years, and speaks with personal knowledge of the splendid traits of character he possessed. He devoted much of his time toward a better understanding between the land of his birth and America, for he truly loved them both. Nothing could prove this more conclusively than his Will, which provided that his remains be cremated and that half the ashes be buried in Japan and the other half in America.

Although Dr. Takamine had the usual struggle for existence of the student, he was fortunate in that he had none of the usual trials and tribulations of the inventor after the promulgation of his discoveries. Success followed at once, and he lived to see those remedies in use in every country of the world.

He made many friends, and people in his employ remained with him many years. Many of the details of his early life were given to the writer by Mr. Woyenaka, his first assistant, who was with him during his first experimentation with the suprarenal extract, and remained continuously with him for twenty-one years.

He was a devoted husband and father, and his home life was ideal. He loved his beautiful country home at Merriewold, in Sullivan County, New York, which was a bit of Japan, the main residence being the building of that country erected and used at St. Louis during the World's Fair there. He loved the wonderful garden with its many trees and flowers, most wonderful rhododendrons among them; and walking about these he relaxed, nothing escaped him; he was supremely happy and he had many a poetic thought. One of the stately pine trees by an unfolding of its bark gave the appearance of a small figure of a female dancer with skirts spread. This he said he called "the Spirit of the pine." Alongside the tree on a pile of rocks he had a little edifice erected which he called "her Temple."

He was a courteous gentleman, a splendid host, a genial companion, and a true friend, faithful and loyal. Of him it may be truly said, "the world is the better for his having lived in it." His discoveries will live for all time, and the writer feels honored in having had his confidence and friendship and in introducing the greatest of his discoveries to the medical profession.

EMIL MAYER.